



# MADE EASY

India's Best Institute for IES, GATE & PSUs

**Test Centres:** Delhi, Noida, Hyderabad, Bhopal, Jaipur, Lucknow, Bhubaneswar, Indore, Pune, Kolkata, Patna

## ESE 2020 : Prelims Exam CLASSROOM TEST SERIES

## GENERAL STUDIES & ENGINEERING APTITUDE

### Answer Key & Solutions of Test No. 21

### Full Syllabus Test 5

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

**TEST NO. 7 (EXPLANATION)**

1. (d)
  - The Constitution (103<sup>rd</sup> Amendment) Act provides 10% reservation in jobs and educational institutions for the economically weaker sections in the general category in addition to the existing cap of almost 50% reservation for the Scheduled Castes, Scheduled Tribes and the Other Backward Classes, taking the total reservation to approximately 60%.
  - The Act provides reservation for:
    - (i) People who have an annual income of less than Rs. 8 lakhs.
    - (ii) People who own less than five acres of farm land.
    - (iii) People who have a house lesser than 1,000 sq feet in a town (or 100 sq yard in a notified municipal area).
  - Article 46 of Constitution of India which comes under non-justiciable Directive Principles of State Policy (DPSP), says that the State shall promote educational and economic interests of "weaker sections", in particular SCs and STs, and protect them from "social injustices" and "all forms of exploitation".
2. (b)

In closed economy, neither export nor import takes place. A closed economy sees itself as self-sufficient and claims it does not want to trade internationally. In fact, it believes it does not need to trade.
3. (d)

According to Economic Survey 2018-19, investment- especially private investment, is the most important factor. It is the key factor that drives demand, creates capacity, increases labour productivity, introduces new technology, allows creative destruction, and generates jobs.
4. (a)
  - Participatory Notes (P-notes) are issued by registered foreign portfolio investors (FPIs) to overseas investors who wish to be a part of the Indian stock market without registering themselves directly after going through a due diligence process. These are also known as Offshore Derivatives Instruments (ODIs).
  - Any entity investing in Participatory Notes is not required to register with SEBI (Securities and Exchange Board of India), whereas all FIIs have to compulsorily get registered. It enables large hedge funds to carry out their operations without disclosing their identity.
5. (d)
6. (a)
  - RBI does not pay interest on Cash Reserve Ratio (CRR) deposits as this amount is reserved and not used to generate income by RBI.
  - The Reserve Bank of India has mandated every bank to have a specific liquid reserve in the form of cash or gold called the Statutory Liquidity Ratio (SLR). The SLR has an upper limit of 40%.
  - Market Stabilization scheme (MSS) is a monetary policy intervention by the RBI to withdraw excess liquidity (or money supply) by selling government securities in the economy.

7. (b)

Government of India launched the Beti Bachao Beti Padhao (BBBP) on 22nd January, 2015 at Panipat in Haryana. It is a tri-ministerial effort of Ministries of Women and Child Development, Health & Family Welfare and Human Resource Development.

The objectives of the Scheme are:

- (i) To prevent gender biased sex selective elimination
- (ii) To ensure survival and protection of the girl child
- (iii) To ensure education and participation of the girl child

8. (b)

Let temperature of the body be  $T^{\circ}\text{C}$ .

$$\frac{dT}{dt} = k(T - 25)$$

$$\frac{dT}{T - 25} = kdt$$

$$\ln(T - 25) = kt + \ln A$$

$$\ln \frac{T - 25}{A} = kt$$

$$T - 25 = Ae^{kt}$$

...(1)

When  $t = 0$ , then  $T = 100$ , from (1)

$$A = 75$$

When  $t = 1$ , then  $T = 75$  and  $A = 75$

From 1

$$\frac{2}{3} = e^k$$

$$T = 25 + 75e^{kt}$$

when  $t = 3$ , then  $T = 25 + 75e^{kt} = 25 + 75 \times \frac{8}{27} = 47.22^{\circ}\text{C}$

9. (a)

$$\text{Volume} = \left| \vec{a} \cdot (\vec{b} \times \vec{c}) \right|$$

$$\vec{a} \cdot (\vec{b} \times \vec{c}) = \begin{vmatrix} -3 & 7 & 5 \\ -3 & 7 & -3 \\ 7 & -5 & -3 \end{vmatrix}$$

$$= -3(-21 - 15) - 7(9 + 21) + 5(15 - 49)$$

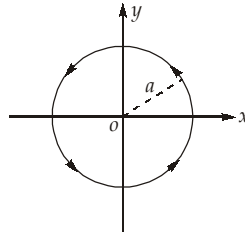
$$= 108 - 210 - 170 = -272$$

$$\text{Volume} = \left| \vec{a} \cdot (\vec{b} \times \vec{c}) \right| = 272 \text{ cubic units}$$

10. (b)

$$\begin{aligned}\vec{F} &= \sin y \hat{i} + x(1 + \cos y) \hat{j} \\ \int_C \vec{F} \cdot d\vec{r} &= \int_C [\sin y \hat{i} + x(1 + \cos y) \hat{j}] (\hat{i} dx + \hat{j} dy) \\ &= \int_C \sin y dx + x(1 + \cos y) dy\end{aligned}$$

On applying Green's theorem, we have



$$\begin{aligned}\int_c (\phi dx + \psi dy) &= \iint_S \left( \frac{\partial \psi}{\partial x} - \frac{\partial \phi}{\partial y} \right) dx dy \\ &= \iint_S [(1 + \cos y) - \cos y] dx dy\end{aligned}$$

Where  $S$  is the circular plane surface of radius  $a$ .

$$= \iint_S dx dy = \text{Area of circle} = \pi a^2$$

11. (c)

$$z = \sqrt{\frac{2(1+i)(1+i)}{(1-i)(1+i)}} = \sqrt{\frac{2(1+i)(1+i)}{2}} = 1 + i$$

$$|z| = \sqrt{1^2 + 1^2} = \sqrt{2}$$

12. (b)

$$\begin{aligned}\frac{(\cos \theta + i \sin \theta)^8}{(\sin \theta + i \cos \theta)^4} &= \frac{(\cos \theta + i \sin \theta)^8}{(i)^4 \left( \cos \theta + \frac{1}{i} \sin \theta \right)^4} = \frac{(\cos \theta + i \sin \theta)^8}{(\cos \theta - i \sin \theta)^4} \\ &= \frac{(\cos \theta + i \sin \theta)^8}{(\cos \theta + i \sin \theta)^{-4}} = (\cos \theta + i \sin \theta)^{12} \\ &= \cos 12\theta + i \sin 12\theta\end{aligned}$$

The value of ' $a$ ' is 12.

13. (d)

Here,

$$I = \int_C \frac{e^{3iz}}{(z+\pi)^3} dz$$

Where  $C$  is a circle  $|z - \pi| = 3.2$  with centre  $(\pi, 0)$  and radius 3.2.

Poles are determined by putting the denominator equal to zero.

$$(z + \pi)^3 = 0$$

$$z = -\pi, -\pi, -\pi$$

There is a pole at  $(z - \pi)$  of order 3. But there is no pole within  $C$ .

By Cauchy integral formula,  $\int_C \frac{e^{3iz}}{(z+\pi)^3} dz = 0$ .

14. (d)

$$p_1(\text{A operating usefully}) = \frac{1}{4}, q_1(A) = 1 - \frac{1}{4} = \frac{3}{4}$$

$$p_2(\text{B operating usefully}) = \frac{1}{3}, \text{ so } q_2(B) = 1 - \frac{1}{3} = \frac{2}{3}$$

$$P(\text{Neither will be operating}) = q_1(A) \cdot q_2(B)$$

$$= \frac{3}{4} \times \frac{2}{3} = \frac{1}{2}$$

$$P(\text{At least one of the machine will be operating})$$

$$= 1 - P(\text{none of them operates})$$

$$= 1 - \frac{1}{2} = \frac{1}{2} = 0.5$$

15. (a)

$$x_2 = x_0 - \frac{x_1 - x_0}{f(x_1) - f(x_0)} f(x_0)$$

16. (a)

Newton-Raphson method is used for algebraic and transcendent equations.

17. (b)

Given matrix is  $\begin{bmatrix} 0 & 1 \\ -6 & 5 \end{bmatrix}$

Characteristic equation  $\begin{bmatrix} 0-\lambda & 1 \\ -6 & 5-\lambda \end{bmatrix} = 0$

$$-\lambda(5 - \lambda) + 6 = 0$$

$$-5\lambda + \lambda^2 + 6 = 0$$

$$\lambda^2 - 5\lambda + 6 = 0$$

$$(\lambda - 2)(\lambda - 3) = 0$$

$$\lambda = 2 \text{ and } 3$$

18. (d)

$$\lim_{x \rightarrow 1} \frac{(x^2 - 1)}{(x - 1)}$$

$$= \lim_{x \rightarrow 1} \frac{(x+1)(x-1)}{(x-1)} = 2$$

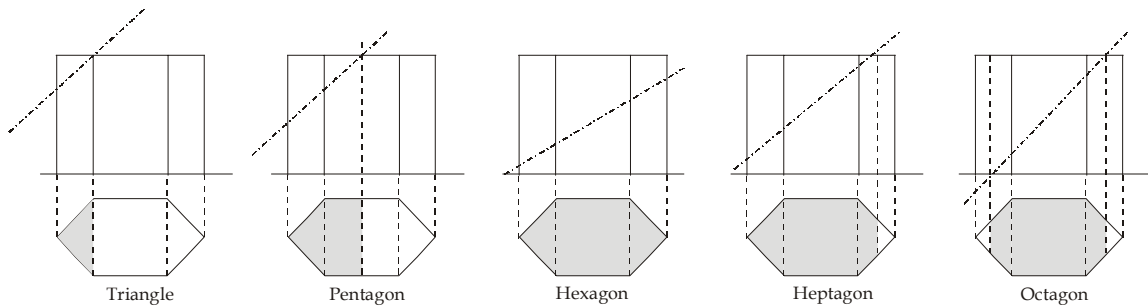
19. (b)

20. (d)

21. (d)

Engineering design process must ensure quality of product, the performance of the product, that are truly derived by the customer who purchases the product. Engineering design process helps to determine product competitiveness and it reduces cycle time, increase the marketability of a product.

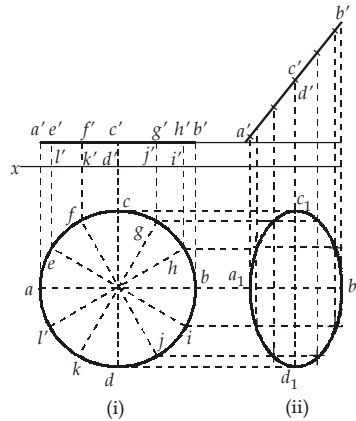
22. (d)



23. (c)

The projection on H.P. (top view) will be an ellipse and on V.P. (front view) will be a line inclined at  $53^\circ$  as shown in figure.

The major axis of ellipse (2a) is parallel to H.P. Hence it will represent its true length in horizontal plane i.e. the diameter of circle.



From figure it is clear that,

$$\text{Major axis of ellipse (2a)} = 50 \text{ mm}$$

$$\text{Minor axis of ellipse (2b)} = 50 \times \cos 53^\circ \quad \left[ \cos 53^\circ = \sqrt{1 - \sin^2 53^\circ} = \sqrt{1 - \left(\frac{4}{5}\right)^2} = \frac{3}{5} \right]$$

$$= 50 \times \frac{3}{5} = 30 \text{ mm}$$

$$\text{Area of ellipse} = \pi ab$$

$$= \pi \times \frac{30}{2} \times \frac{50}{2} = 375\pi \text{ mm}^2$$

24. (a)

When picture plane is between station point and object then perspective projection is smaller than elevation of object.

When object is between station point and picture plane then perspective projection is larger than elevation of object.

There are two methods available for making perspective projection of a point:

1. Visual ray method.
2. Vanishing point method.

Both methods require thorough understanding of principles of orthographic projection.

25. (b)

 $E_1$  = The event in which A speaks truth $E_2$  = The event in which B speaks truth

$$\text{Then } P(E_1) = \frac{60}{100} = \frac{3}{5}, P(E_2) = \frac{80}{100} = \frac{4}{5}$$

$$\text{and } P(\bar{E}_1) = \frac{2}{5}, P(\bar{E}_2) = \frac{1}{5}$$

$$\begin{aligned} \therefore \text{ Required probability} &= P[(E_1 \cap E_2) \cup (\bar{E}_1 \cap \bar{E}_2)] \\ &= P(E_1 \cap E_2) + P(\bar{E}_1 \cap \bar{E}_2) \\ &= P(E_1) \cdot P(E_2) + P(\bar{E}_1) \cdot P(\bar{E}_2) \\ &= \left(\frac{3}{5} \times \frac{4}{5}\right) + \left(\frac{2}{5} \times \frac{1}{5}\right) = \frac{14}{25} = 0.56 \end{aligned}$$

26. (c)

$$\begin{aligned} \text{Required number of triangles} &= \text{Total number of triangles} - \text{Number of triangles having one side} \\ &\text{common with the octagon} - \text{Number of triangles having two sides common with the octagon} \\ &= {}^8C_3 - ({}^8C_1 \times {}^4C_1) - 8 = 16 \end{aligned}$$

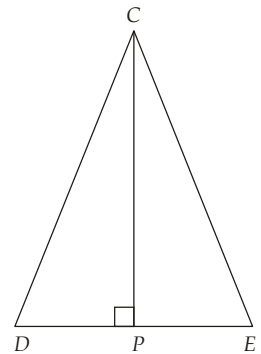
27. (d)

Area of equilateral triangle

$$ABC = \frac{\sqrt{3}}{4} \times (12)^2 = 36\sqrt{3} \text{ cm}^2$$

$$\begin{aligned} \text{Area of } \triangle CDE &= \frac{1}{2} \times DE \times CP \\ &= \frac{1}{2} \times 4 \times \frac{\sqrt{3}}{2} \times 12 = 12\sqrt{3} \text{ cm}^2 \end{aligned}$$

$$\text{Area of shaded region} = 36\sqrt{3} - 12\sqrt{3} = 24\sqrt{3} \text{ cm}^2$$



28. (b)

Let the present age of the son be 'x' years and the present age of his father be 'y' years.

$$\text{then } y = 3x \quad \dots(1)$$

$$\text{Again } (y + 12) = 2(x + 12)$$

Substituting  $y = 3x$  in eq. (2), we get

$$x = 12$$

$$y = 36$$



29. (b)

$$\left(x + \frac{1}{x}\right)^2 = x^2 + \frac{1}{x^2} + 2x \cdot \frac{1}{x}$$

$$(3)^2 = x^2 + \frac{1}{x^2} + 2 \quad \left(\text{Putting } x + \frac{1}{x} = 3\right)$$

$$\Rightarrow x^2 + \frac{1}{x^2} = 7$$

30. (b)

$$(a + b + c)^2 \geq 0$$

$$\therefore (a + b + c)^2 = a^2 + b^2 + c^2 + 2(ab + bc + ca) \geq 0 \quad \dots(i)$$

$$\therefore 1 + 2(ab + bc + ca) \geq 0 \quad (\because a^2 + b^2 + c^2 = 1)$$

$$\Rightarrow (ab + bc + ca) \geq -\frac{1}{2} \quad \dots(ii)$$

Also,  $a^2 + b^2 \geq 2ab$ ,  $b^2 + c^2 \geq 2bc$ ,  $c^2 + a^2 \geq 2ac$

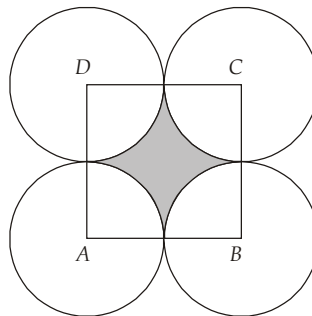
$$(a^2 + b^2 + b^2 + c^2 + c^2 + a^2) \geq 2ab + 2bc + 2ac$$

$$\Rightarrow a^2 + b^2 + c^2 \geq ab + bc + ac \quad (\because a^2 + b^2 + c^2 = 1)$$

$$\Rightarrow ab + bc + ac \leq 1$$

$$\therefore -\frac{1}{2} \leq ab + bc + ac \leq 1$$

31. (b)



Let the each side of the square be 2 cm, then

Area of square = 4 cm<sup>2</sup> and area of 4 quadrants of the four circles (i.e., unshaded part inside the square)

$$= 4 \times \frac{1}{4} \pi \times (1)^2 = \pi \text{ cm}^2$$

$$\therefore \text{Area of shaded region} = (4 - \pi) \text{ cm}^2$$

Therefore, the required ratio =  $\frac{\pi}{4 - \pi} = \frac{22/7}{6/7} = \frac{11}{3}$

32. (b)

$$\frac{3}{4} \times (x-2)x = (x+7)(x-10)$$

$$\Rightarrow x^2 - 6x - 280 = 0$$

$$\Rightarrow x = 20 \text{ and } x = -14$$

So, the acceptable value is  $x = 20$

$$\therefore \text{Total work} = (x-2) \times x = 18 \times 20 = 360 \text{ unit}$$

Now let the number of days required by  $(x+10)$  boys to finish the work =  $d$

$$360 = 30 \times d \quad (\because 30 = 20 + 10)$$

$$\Rightarrow d = 12 \text{ days}$$

33. (c)

Distance travelled by them in first hour = 12 km

Distance travelled by them in second hour = 13 km

Distance travelled by them in third hour = 14 km and so on

Thus, in 9 hours they will cover exactly 144 km and in 9 hr each will cover half of the total distance.

$$(8 \times 9 = 72 \text{ and } 4 + 5 + 6 + 7 + 8 + 9 + 10 + 11 + 12 = 72)$$

34. (c)

$P - M \rightarrow P$  is the brother of  $M$

$M + N \rightarrow M$  is the mother of  $N$

$N \times Q \rightarrow N$  is the sister of  $Q$

Therefore,  $P$  is the maternal uncle of  $Q$ .

35. (a)

When the digit 5 is on the bottom then 1 will on the upper surface.

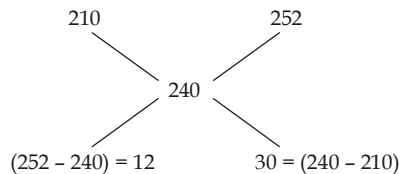
36. (c)

Let the cost price of the mixture be ₹  $x$  per kg, then selling price =  $x + \frac{25 \times x}{100} = 300$

$$\Rightarrow 1.25x = 300$$

$$\Rightarrow x = 240$$

Now the average cost price of mixture = ₹ 240



Therefore, the ratio of cheaper to costlier tea leaves is 12 : 30. i.e., 2 : 5.

37. (b)

•        •        •        •        •  
Eshan    Bana    Ajay    Chandan    Dinesh

Therefore, Ajay is sitting in between Bana and Chandan.

38. (a)
- **Quality of Design** – It is all about set conditions that the product or service must minimally have to satisfy the requirements of the customer
  - **Quality of conformance**- It is basically meeting the standards defined in the design phase after the product is manufactured or while the service is delivered.
  - **Quality of Performance**- -It measures the degree to which the product or Service satisfies the customer expectation
39. (c)
40. (d)
- The focus group is a special type of group in terms of purpose, size, composition and procedures. A focus group is typically composed of seven to ten participants who are unfamiliar with each other. These participants are selected because they have certain characteristic(s) in common that relate to the topic of the focus group. The quality of focus group research is highly dependent on the qualifications of the interviewer. Trained and skilled interviewers are hard to find. In quality management, focus groups are useful to:
- Gather insight useful in the strategic planning process.
  - Generate ideas for survey questionnaires.
  - Develop needs assessment, e.g. training needs.
  - Test new program ideas.
  - Determine customer decision criteria.
  - Recruit new customers.
41. (c)
- Product audits differ from inspection in the following ways:
- audits are broader in scope than inspections,
  - audits provide more depth than inspections,
  - audits provide information useful for product quality improvement, and
  - audits offer another level of assurance beyond routine inspection.
42. (a)
- Quality Function Deployment (QFD) or the house of quality is the foundation to link the voice of the customers with technical design requirements of a product. In other words, abstract specifications required by the targeted customers are translated into specific product technical requirements.
43. (d)
44. (d)
- The measures which provide feedback on the performance of the Six Sigma are:
- Customer satisfaction
  - Key process performance
  - Scorecard metrics on how the business is running
  - Profit-and-loss statements
  - Employee attitude

45. (a)
- Fuel cells are highly efficient power-generating systems that produce electricity by combining fuel (hydrogen) and oxygen in an electrochemical reaction.
  - Compared to vehicles powered by an internal combustion engine, fuel cells have very high energy conversion efficiency, and near-zero pollution; CO<sub>2</sub> and water vapour being the only emissions.
  - According to a new analysis by Greenpeace, India is the largest emitter of SO<sub>2</sub> in the world.
  - Fuel-Cell installation has high initial cost which is the biggest hurdle in the widespread commercialization of fuel cells.
46. (b)
- The NGT deals with civil cases under the seven laws related to the environment, these include:
- i. The Water (Prevention and Control of Pollution) Act, 1974,
  - ii. The Water (Prevention and Control of Pollution) Cess Act, 1977,
  - iii. The Forest (Conservation) Act, 1980,
  - iv. The Air (Prevention and Control of Pollution) Act, 1981,
  - v. The Environment (Protection) Act, 1986,
  - vi. The Public Liability Insurance Act, 1991
  - vii. The Biological Diversity Act, 2002.
- Any violation pertaining to these laws or any decision taken by the Government under these laws can be challenged before the NGT.
47. (c)
- The five strategic goals of Aichi Biodiversity targets (2011-2020) are:
- **Strategic Goal A:** Address the underlying causes of biodiversity loss by mainstreaming biodiversity across government and society.
  - **Strategic Goal B:** Reduce the direct pressures on biodiversity and promote sustainable use.
  - **Strategic Goal C:** To improve the status of biodiversity by safeguarding ecosystems, species and genetic diversity.
  - **Strategic Goal D:** Enhance the benefits to all from biodiversity and ecosystem services.
  - **Strategic Goal E:** Enhance implementation through participatory planning, knowledge management and capacity building.
48. (d)
49. (b)
- Rotterdam Convention was adopted in 1998 by a conference of Plenipotentiaries in Rotterdam, Netherlands and entered into force on 24th February 2004.
  - The Convention covers pesticides and industrial chemicals that have been banned or severely restricted for health or environmental reasons by parties and which have been notified by parties for inclusion in the PIC procedure.

50. (b)
- Coalbed Methane is considerable quantities of methane is trapped within coal seams. A significant portion of this gas remains as free gas in the joints and fractures of the coal seam.
  - Shale gas is a mixture of lot of Methane, Ethane, Propane, Butane and very little quantity of other hydrocarbons.
  - The Cambay Basin in Gujarat, the Assam-Arakan basin in Northeast India, and the Gondwana Basin are the major source locations of Shale Gas.
51. (c)
- Habitat is the physical environment in which an organism lives. Many habitats make up the environment.
  - A single habitat may be common for more than one organism which have similar requirements. For example, a single aquatic habitat may support a fish, frog, crab, phytoplankton and many others.
52. (b)
- The Green Climate Fund (GCF) is a fund within the framework of the UNFCCC. It is a mechanism to redistribute money from the developed to the developing world. GCF helps developing countries financially in adapting mitigation practices to counter climate change.
53. (c)
- In May 1995, the United Nations Environment Programme started investigations on the POPs. The process began with 12 POPs which were most common at that time. They were called "Dirty Dozen".
  - The Dirty Dozen are: Aldrin, chlordane, DDT, dieldrin, endrin, heptachlor, hexachlorobenzene, mirex, polychlorinated biphenyls, polychlorinated dibenzo-p-dioxins, polychlorinated dibenzofurans, and toxaphene.
54. (c)
55. (c)
- India signed the Paris Agreement in New York in the year of 2016. Paris Agreement pertains to post-2020 climate actions. In the pre-2020 period, developed countries are to act as per the Kyoto Protocol and some developing countries have taken voluntary pledges.
56. (c)
- Indian Railway had developed environment friendly 'Bio-toilets in association with Defence Research and Development Organisation (DRDO).
  - Bio-toilets evacuate discharge into a biodigester tank, containing anaerobic bacteria, fitted underneath train coach in small space. The bacteria convert human faecal matter into water and small amount of gases (including methane) by the process of hydrolysis, acetogenesis, acidogenesis and methanogenesis.
57. (c)
- Potential to add value starts at a high level of influence, reducing as decisions are made, design freezes are imposed, contracts are issued and the work is progressively completed.

58. (d)

59. (d)

$$\text{Cost performance index} = \frac{EV}{AC} = \frac{40\% \text{ of } 100000}{60000} = \frac{4}{6}$$

$$\text{Estimate at completion, (EAC)} = \frac{BAC}{CPI} = \frac{100000}{4/6} = \text{Rs. } 150000$$

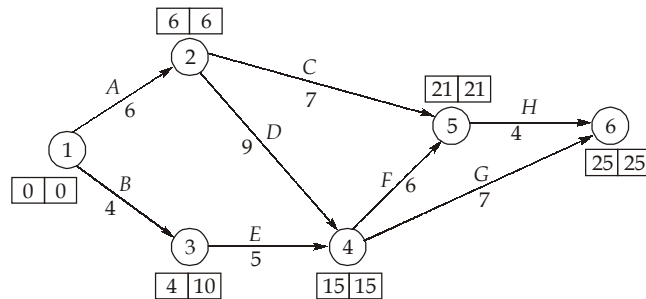
(EV = Earned Value; AC = Actual Cost; BAC = Budgeted Actual Cost; CPI = Cost Performance Index)

60. (b)

PERT is event oriented while CPM is activity oriented.

61. (d)

62. (b)



Critical path  $\rightarrow 1 - 2 - 4 - 5 - 6$

63. (c)

$$\sigma = \sqrt{\text{Sum of variance of activity on critical path}}$$

$$= \sqrt{5^2 + 5^2 + 5^2 + 5^2} = \sqrt{100}$$

$$\sigma = 10$$

64. (b)

Meissner effect is related to magnetic properties of super-conductors.

65. (d)

Superconducting material on being subjected to the critical field, the material will come to normal state.

66. (d)

- Insulation resistance decreases with increase in temperature.
- When insulator exposed to moisture, the surface resistance decreases.
- If applied voltage is more than breakdown voltage, the insulation resistance changes.
- The insulation resistance decreases with passage of time.

67. (a)

$$H = 2 \times 10^3 \text{ A/m}, \phi = 2 \times 10^{-5} \text{ wb}$$

$$\text{Magnetic flux density, } B = \frac{\phi}{A} = \frac{2 \times 10^{-5}}{0.2 \times 10^{-4}} = 1 \text{ wb/m}^2$$

$$\text{Permeability, } \mu = \frac{B}{H} = \frac{1}{2 \times 10^3} = 0.5 \times 10^{-3} \text{ N/A}^2$$

68. (a)

Simple cubic crystal:  $a = 2r$ 

$$\text{BCC : } a = \frac{4}{\sqrt{3}}r$$

$$\text{FCC : } a = 2\sqrt{2}r$$

69. (c)

The alignment of the dipoles is also temperature dependent and increases if the temperature of specimen is lowered.

70. (c)

71. (b)

	$x$	$y$	$z$
Intercepts (in terms of lattice parameter)	0.5	1	$\infty$
Reciprocals	2	1	0
Enclosure	(2 1 0)		

72. (c)

73. (d)

Creep curve is a plot between strain versus time.

74. (c)

75. (b)

76. (a)

The potential for Blockchain technology is not limited to bitcoin. It has many other applications in delivery of services and in public networks.

77. (d)

Moving Picture Experts Group (MPEG) is the name of a family of standards used for coding audio-visual information in a digital compressed format.

78. (c)  
Temporal compression is a technique of reducing compressed video size by not encoding each frame as a complete image. The frames that are encoded completely (like a static image) are called key frames. All other frames in the video are represented by data specifying the change since the last frame. These frames are called delta frames. They are also called as P,I frames respectively.
79. (a)
80. (d)
81. (b)  
Pegasus is a spyware that can be installed on devices running all versions of iOS, Apple's mobile operating system, developed by the Israeli cyberarms firm, NSO Group.
82. (c)  
e-Rashtriya Kisan Agri Mandi (e-RaKAM) portal to provide a platform for farmers to sell agricultural produce. It is a digital initiative that aims to bring together the farmers, PSUs, civil supplies and buyers on a single platform to ease the selling and buying process of agricultural products.
83. (b)  
National Electronic Toll Collection (NETC) is developed by NPCI. It offers an interoperable nationwide toll payment solution including clearing house services for settlement and dispute management. Interoperability, as it applies to National Electronic Toll Collection (NETC) system, encompasses a common set of processes, business rules and technical specifications which enable a customer to use their FASTag as payment mode on any of the toll plazas irrespective of who has acquired the toll plaza.
84. (d)
85. (b)  
Normative ethics is a part of moral philosophy, or ethics concerned with criteria of what is morally right and wrong.
86. (a)
- Copyright is sanctioned to prevent others from: Copying the work, publishing and selling copies commercially, renting or lending the work in a free market, and doing or demonstrating the work in public
  - A trade secret means information, which is kept confidential as a secret. This is generally not known in the relevant industry, offering an advantage to its owner over other competitors.
  - Patent is a contract between an inventor as an individual and the society as a whole. The inventor has exclusive right to prevent anybody making use of and/or selling a patented invention.



87. (d)

The factors that shape self-confidence in a person or professional are:

- (i) Heredity (attitudes of parents) and family environment (elders)
- (ii) Friendship (influence of friends/colleagues)
- (iii) Influence of superiors/role models
- (iv) Training in the organization

88. (c)

- Micro-Ethics approach stresses more about some typical and everyday problems which play an important role in the field of engineering and in the profession of an engineer.
- Macro-Ethics approach deals with all the social problems which are unknown and suddenly burst out on a regional or national level. It is concerned with all the social problems which can be mitigated by collective social responsibilities of engineering profession with societal decision about technology.

89. (b)

90. (b)

- Gini Coefficient or index measures the degree of inequality in the distribution of family income in a country. The more nearly equal a country's income distribution, the lower its Gini Coefficient. In other words, the more unequal a country's income distribution, the higher its Gini index.
- If income were distributed with perfect equality the index would be zero; if income were distributed with perfect inequality, the index would be 100.

91. (b)

92. (a)

93. (c)

A line which is parallel to horizontal plane will have no horizontal trace.

94. (b)

95. (a)

96. (c)

Independent float of an activity does not depend on preceding activities and it also does not disturb succeeding activities.

97. (a)

Silicon increases the resistance of magnetic material which reduces the eddy current loss of the transformer.

98. (b)  
With a small additional energy, the valence electrons in germanium can become free electrons. The reason behind this is at highest energy level the bonding energy is the lowest.
99. (c)  
The good damping capacity of grey cast iron and the high compressive strength make it suitable for machine tool beds. They have poor tensile strength.
100. (b)  
The IP addressing is done at the network layer which is the 3<sup>rd</sup> layer of the OSI model thus layer 2 and layer 1 devices cannot be used to connect to the internet.

