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ESE 2020 : Prelims Exam
CLASSROOM TEST SERIES

GENERAL STUDIES & ENGINEERING APTITUDE

Answer Key & Solutions of
Test No. 25

Full Syllabus Test 9

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

DETAILED EXPLANATIONS

2.   **(d)**
- NITI Aayog's Three-Year Action Plan Agenda proposes reduction of the fiscal deficit to 3% of the GDP by 2018-19, and the revenue deficit to 0.9% of the GDP by 2019-20.
- Besides, adopt consumer friendly measures such as provision of electricity to all households by 2022, LPG connection to all BPL households, elimination of black carbon by 2022, and extension of the city gas distribution programme to 100 smart cities are some of the agenda of Three-Year Action Plan.

4.   **(a)**

The Scheme of Mega Food Park aims at providing a mechanism to link agricultural production to the market by bringing together farmers, processors and retailers so as to ensure maximizing value addition, minimizing wastage, increasing farmers' income and creating employment opportunities particularly in rural sector.

5.   **(d)**

Domestic Systemically Important Bank (D-SIB) means that the bank is too-big-to-fail. According to the RBI, some banks become systemically important due to their size, cross-jurisdictional activities, complexity and lack of substitute and interconnection. Banks whose assets exceed 2% of GDP are considered part of this group. D-SIBs are required to maintain higher share of risk-weighted assets.

6.   **(c)**

National Green Tribunal (NGT) has appointed former Justice U. C. Dhyani, as head of the three-member committee to oversee rejuvenation work of the Ganga river.

7.   **(b)**

M-STrIPES (Monitoring System for Tigers - Intensive Protection and Ecological Status) is a software-based monitoring system launched across Tiger Reserves in India by the National Tiger Conservation Authority (NTCA).

9.   **(b)**

$$L\frac{\sin t}{t} = \int_0^\infty e^{-st}\frac{\sin t}{t}dt = \tan^{-1}\frac{1}{s}$$

Let $s \to 0$

$$\Rightarrow \qquad \int_0^\infty \frac{\sin t}{t}dt = \tan^{-1}\infty = \frac{\pi}{2}$$

10. (d)

$$\text{Particular integral} = e^t \frac{1}{(D+1)^2 - 2(D+1) + 2} t^3$$

$$= e^t \frac{1}{(D^2+1)} t^3 = e^t(1+D^2)^{-1} t^3$$

$$= e^t(1 - D^2 + D^4....) t^3$$

(Ignoring powers of order greater than 4.)

$$= e^t(t^3 - 6t)$$

11. (b)

For any Eigen vector X,

$$[A - \lambda I] X = 0$$

$$\begin{bmatrix} 1-\lambda & 2 & 2 \\ 0 & 2-\lambda & 1 \\ -1 & 2 & 2-\lambda \end{bmatrix} \begin{bmatrix} 2 \\ 1 \\ 0 \end{bmatrix} = 0$$

$$2(1 - \lambda) + 2 = 0$$

$$2 - 2\lambda + 2 = 0$$

$$2\lambda = 4$$

$$\lambda = 2$$

12. (a)

Here, the limit of y depends on x. So, we first have to integrate w.r.t. y and then integrate w.r.t. x.

$$\int_0^3 \int_0^x (6 - x - y) \, dy \, dx$$

$$= \int_0^3 \left(6y - xy - \frac{y^2}{2} \right)_0^x dx = \int_0^3 \left(6x - x^2 - \frac{x^2}{2} \right) dx$$

$$= \left[\frac{6x^2}{2} - \frac{3x^3}{6} \right]_0^3 = 27 - \frac{27}{2} = \frac{27}{2}$$

13. (d)

We know that, the sum of a probability distribution of random variable is one.

i.e. $\Sigma P(X) = 1$

$0 + n + 2n + 2n + 3n + n^2 + 2n^2 + 7n^2 + n = 1$

$10n^2 + 9n - 1 = 0$

$(10n - 1)(n + 1) = 0$

$$n = \frac{1}{10} \text{ or } -1$$

But $n = -1$ is rejected because probability cannot be negative,

∴ $n = \dfrac{1}{10}$

$P(0 < X < 4) = P(X = 1) + P(X = 2) + P(X = 3)$

$= n + 2n + 2n$

$= 5n = 0.5$

14. (b)

$$f(x) = x^2 e^{-x}$$
$$f'(x) = 2xe^{-x} - x^2 e^{-x} = x \cdot e^{-x}(2 - x)$$

For maxima or minima

$$f'(x) = 0$$
$$xe^{-x}(2 - x) = 0$$
$$x = 0, 2$$
$$f''(x) = (x^2 - 4x + 2)e^{-x}$$
$$f''(0) = 2 > 0 \text{ minima}$$
$$f''(2) = -2e^{-2} < 0 \text{ maxima}$$

Hence the maximum value of $f(x)$ occurs at $x = 2$.

15. (b)

$u + iv$ is analytic, C.R. equations are satisfied i.e.

$$u_x = v_y$$
$$u_y = -v_x \qquad \qquad \qquad \qquad \text{...(1)}$$
$$u(x, y) = c$$
$$v(x, y) = c'$$

Slope, $m_1 = \dfrac{dy}{dx} = \dfrac{-u_x}{u_y}$

Slope, $m_2 = \dfrac{dy}{dx} = \dfrac{-v_x}{v_y}$

$$m_1 \times m_2 = \frac{-u_x}{u_y} \times \frac{-v_x}{v_y} = \frac{-v_y}{-v_x} \times \frac{-v_x}{v_y} = -1 \qquad \text{[Using eq. (1)]}$$

∴ u and v are orthogonal.

16.   (c)

The direction of largest increase of a function(f) is given by ∇f, where,

$$\nabla f \;=\; \frac{\partial f}{\partial x}\hat{i} + \frac{\partial f}{\partial y}\hat{j} + \frac{\partial f}{\partial z}\hat{k}$$

Here, $f \;=\; xy^3 - x^2$

Therefore, $\nabla f \;=\; (y^3 - 2x)\,\hat{i} \; + (3xy^2)\,\hat{j}$

∇f at $(1 , 1)$ $=$ $(1^3 - 2 \times 1)\hat{i} \; + (3 \times 1 \times 1)\,\hat{j}$

$=\; -\,\hat{i} \; + 3\,\hat{j}$

17.   (a)

Let the function be,

$$f(x) \;=\; ax + b = 0 \qquad \text{(linear function)}$$

The solution of the which is

$$x \;=\; -\frac{b}{a}$$

Let the initial estimate of the root be x_0.

According to Newton-Raphson method, the first estimate for the root is

$$x_1 \;=\; x_0 - \frac{f(x_0)}{f'(x_0)} = x_0 - \frac{ax_0 + b}{a} \;=\; \frac{ax_0 - ax_0 - b}{a} = \frac{-b}{a}$$

Hence, the first estimate itself gives the solution of $f(x)$, if $f(x)$ is a linear function.
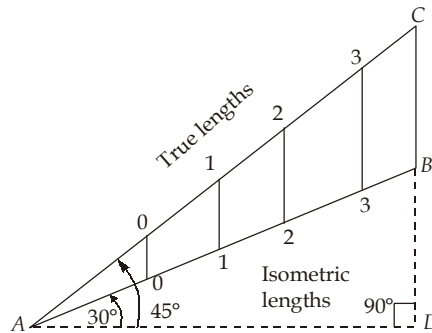
18.   (d)

In Δabc

$$ab^2 \;=\; ac^2 + bc^2$$

$$ab \;=\; \sqrt{\left(\sqrt{24}\right)^2 + \left(2\sqrt{3}\right)^2} \;=\; 6 \text{ cm}$$

$$\therefore \qquad\qquad ab = ab_1 = a'd'$$

$$\because \text{In } \Delta a'b_1'd', \qquad a'b_1' = \text{True length} = \sqrt{\left(b_1'd'\right)^2 + \left(a'd'\right)^2}$$

$$= \sqrt{6^2 + 6^2}$$

$$\text{True length, } (a'b_1') = 6\sqrt{2} \text{ cm}$$

19.   **(b)**

According to isometric scale, (as shown),
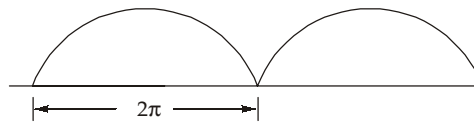

$$\frac{\text{Isometric length}}{\text{True length}} = \frac{AB}{AC}$$

$$= \frac{AD/\cos 30°}{AD/\cos 45°}$$

$$= \frac{\cos 45°}{\cos 30°} = \frac{1}{\sqrt{2}} \times \frac{2}{\sqrt{3}} = \sqrt{\frac{2}{3}}$$

20.   **(b)**

$\omega = \pi$ rad/s, $r = 1$ m

So total angle rotated in 4 sec = $4 \times \pi = 4\pi$ rad

So, number of rotations = $\dfrac{4\pi}{2\pi}$ = 2

Point 'p' is on the circumference of circle, path traced out will be cycloid.

So,   area under cycloid = $3 \times$ (area of generating circle) = $3\pi r^2$

     total area under curve = $2 \times$ (area under cycloid) = $2 \times (3\pi r^2)$
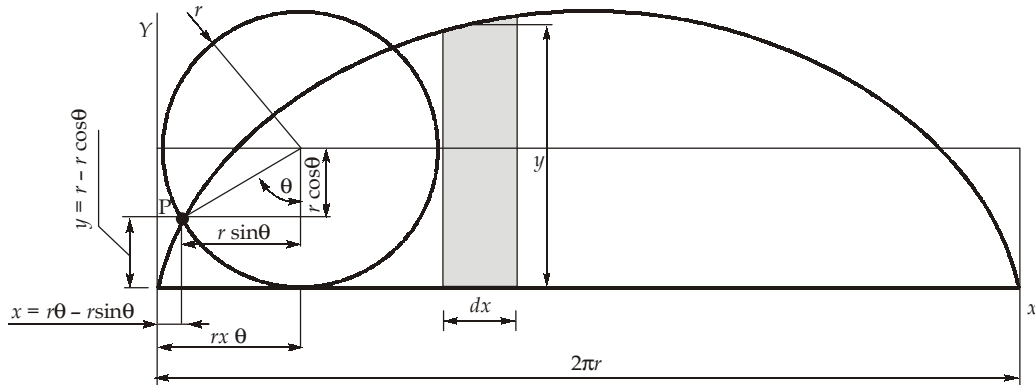
$$= 6 \times (\pi r^2) = 6\pi \text{ m}^2$$

     and path by point 'P' = $2 \times$ (arc length of cycloid)

$$= 2 \times (8\,r) = 16r = 16 \text{ m}$$

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Additional explanation for formulae used:

The two formulae used in explanation are

1. Area under cycloid curve = 3 × area of generating circle.
2. Length of cycloid curve = 8 × radius of generating circle

From diagram is it clear that

x coordinate of any point on cycloid is given by the formula

$$x = r(\theta - \sin\theta)$$

and y coordinate of any point on cycloid is given by the formula $y = r(1 - \cos\theta)$

From above diagram it is clear that area below cycloid is

$$= \int_0^{2\pi r} y\,dx = \int_0^{2\pi r} r(1-\cos\theta)\,dx = \int_0^{2\pi} r(1-\cos\theta)\frac{dx}{d\theta}\,d\theta = \int_0^{2\pi} r(1-\cos\theta)\frac{d(r\theta - r\sin\theta)}{d\theta}\,d\theta$$

$$= \int_0^{2\pi} r(1-\cos\theta)r(1-\cos\theta)\,d\theta = r^2\int_0^{2\pi}(1-\cos\theta)^2\,d\theta = r^2\int_0^{2\pi}(1-2\cos\theta+\cos^2\theta)\,d\theta$$

$$= r^2\int_0^{2\pi}\left(1-2\cos\theta+\frac{1+\cos2\theta}{2}\right)d\theta = r^2\int_0^{2\pi}\left(\frac{3}{2}-2\cos\theta+\frac{\cos2\theta}{2}\right)d\theta$$

$$= r^2\left[\left[\frac{3\theta}{2}\right]_0^{2\pi} + [-2\sin\theta]_0^{2\pi} + \left[\frac{\sin2\theta}{4}\right]_0^{2\pi}\right] = r^2\left\{\frac{6\pi}{2}\right\} = 3\pi r^2 = 3 \times \text{area of generating circle}$$

21. (b)

- For a backward Vernier scale, the length of each division of Vernier scale is greater than length of each division of primary scale.

  Least count = length of one Vernier scale division – length of one main scale division

- A diagonal scale is based on principle of diagonal division or similarity of triangles.

- $$\text{R.F.} = \frac{\text{Length on drawing}}{\text{Actual length}}$$
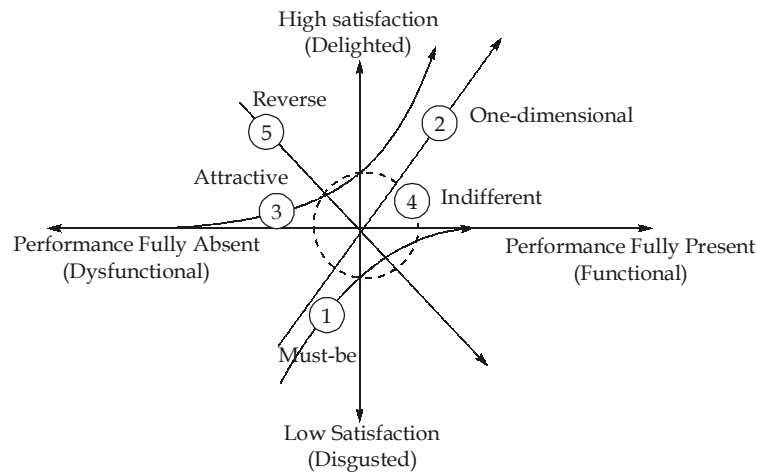
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22.   (b)

According to the Society of Manufacturing Engineers (SME):

- Improved engineering could prevent accidents.
- Employees should be willing to learn and accept safety rules.
- Safety rules could be established and enforced.
- Financial savings from safety improvement could be reaped by savings in compensation and medical bills.

23.   (b)

All statements are correct. The best safeguard for a robot is a barrier around the perimeter of its work envelope. Sensitized doors or gates in the barrier can also decrease the hazard potential.

24.   (b)

Kano model is based on customer needs assessment. The Kano model defines customer needs based on customer satisfaction.

There are five types of customer needs:

(1) must-be,

(2) one dimensional,

(3) Attractive,

(4) indifferent, and

(5) reverse

- A customer need in terms of a product attribute is considered 'must-be' if its absence produces absolute dissatisfaction and its presence does not increase satisfaction.
- An attribute is considered 'one dimensional' if its fulfilment increases the satisfaction and vice versa.
- An attribute is considered 'attractive' if it leads to a greater satisfaction-it is not expected to be in the product.
- An attribute is considered 'indifferent' if its presence or absence does not contribute to the satisfaction.
- An attribute is considered 'reverse' if its presence causes dissatisfaction and vice versa.

25. **(b)**

In conceptual design process we initiate the design and come up with a number of design concepts and then narrow down to the single best concept. This involves the following steps:

- Identification of customer needs: The main objective of this is to completely understand the customers' needs and to communicate them to the design team
- Problem definition: The main goal of this activity is to create a statement that describes what all needs to be accomplished to meet the needs of the customers' requirements.
- Gathering Information: In this step, all the information is collected that can be helpful for developing and translating the customers' needs into engineering design.
- Conceptualization: In this step, broad sets of concepts are generated that can potentially satisfy the problem statement
- Concept selection: The main objective of this step is to evaluate the various design concepts, modifying and evolving into a single preferred concept.

26. **(d)**

Let the roots be α and α.

$$\text{Sum of roots} = \alpha + \alpha = 2\alpha = -\frac{2k}{9}$$

$$\Rightarrow \qquad \alpha = -\frac{k}{9}$$

$$\text{and} \qquad \text{product of the roots} = \alpha^2 = \frac{4}{9}$$

$$\therefore \qquad \left(-\frac{k}{9}\right)^2 = \frac{4}{9}$$

$$\Rightarrow \qquad \frac{k^2}{81} = \frac{4}{9}$$

$$\Rightarrow \qquad k^2 = 36$$

$$\Rightarrow \qquad k = \pm 6$$

Alternatively: Since the roots of quadratic equation are equal, its discriminant must be zero.

i.e., $\qquad b^2 - 4ac = 0$

$\therefore \qquad (2k)^2 - 4 \times 9 \times 4 = 0$

$\Rightarrow \qquad k = \pm 6$

27. **(d)**

Tap A can fill the tank in 10 hours i.e. In 1 hour A fills 10% of the tank.

Tap B can fill the tank in 20 hours i.e. In 1 hour B fills 5% of the tank.

Tap C can empty the tank in 30 hours i.e. In 1 hour C empties $\left(\frac{10}{3}\right)$% of the tank.

Each tap is opened, one by one, for exactly one hour and then closed.

Therefore, in every 3 hours: $10\% + 5\% - \frac{10}{3}\% = \frac{35}{3}\%$ of the tank gets filled.

The tank is already $\frac{1}{4}$ full. Therefore, we only have $\frac{3}{4}$ i.e. 75% of the tank to fill.

In 18 hours, it fills: $\frac{35}{3}\% \times 6 = 70\%$

In the 19th hour, tap A will start filling. However, we only need + 5% to make it 75%.

So tap A should fill 5% in 1/2 hour i.e. 30 minutes.

Therefore, it will take 18 hours 30 minutes to completely fill the tank, after which it will begin to overflow.

28. **(b)**

The year 2020 is a leap year. So, it has 2 odd days.

∴ The day on 15th August, 2020 will be 2 days beyond the day on 15th August, 2019.

Now, number of days from 14th February 2019 to 15th August 2019 = 14 + 31 + 30 + 31 + 30 + 31 + 15 = 182 days = 26 weeks.

∴ 15th August 2020 will be a Saturday (Thursday + 2 days)

29. **(a)**

Let x, y, z be the hundred, tens and unit digits of the original number, then

$$(100z + 10y + x) - (100x + 10y + z) = 594$$
$$\Rightarrow \qquad 99(z - x) = 594$$
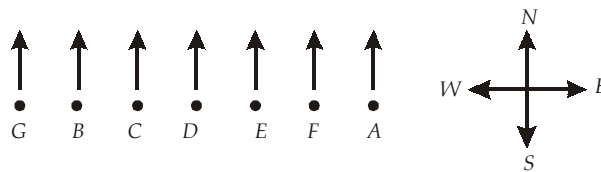$$\Rightarrow \qquad (z - x) = 6$$

So the possible values of (x, z) are (1, 7), (2, 8) and (3, 9).

x and z can never be zero since if the left most digit becomes zero, then it means this number is only two-digit number.

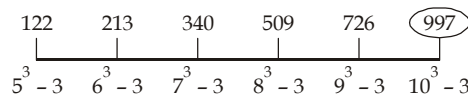Again the tens digit can have the values viz., 0, 1, 2, 3 ...9.

So the minimum possible value of $x + y + z = 1 + 0 + 7 = 8$.

30. **(d)**

A is in extreme right.

31. **(b)**

32. **(c)**

$$(x^3 + y^3 + z^3 - 3xyz) = (x + y + z)(x^2 + y^2 + z^2 - xy - yz - zx)$$
$$= (x + y + z)[(x + y + z)^2 - 3(xy + yz + zx)]$$
$$= 6 \times [36 - 3 \times 11] = 6 \times 3 = 18$$

33. **(b)**

Out of 30 numbers, 2 numbers can be chosen in $^{30}C_2$ ways. So, exhaustive number of cases = $^{30}C_2$ = 435.

Since $a^2 - b^2$ is divisible by 3 if both a and b are divisible by 3 or none of a and b is divisible by 3. Thus, the favourable number of cases = $^{10}C_2 + {}^{20}C_2 = 235$

Hence, required probability = $\dfrac{235}{435} = \dfrac{47}{87}$

34. **(c)**

$$\frac{\text{Area of } \Delta CMN}{\text{Area of } \square ABNM} = \frac{1}{2}$$

$$\therefore \qquad \frac{\text{Area of } \Delta CMN}{\text{Area of } \Delta CAB} = \frac{1}{3}$$

$$\Rightarrow \qquad \frac{MN}{AB} = \frac{CM}{CA} = \frac{1}{\sqrt{3}}$$

$$\Rightarrow \qquad \frac{CM}{MA} = \frac{1}{\sqrt{3}-1} = \frac{\sqrt{3}+1}{2}$$

36. **(c)**

Dye penetration test is surface type NDT. Advantages of Dye penetration include high sensitivity to small flaws, ease and flexibility. All sort of surface like metals, ceramics, glass rubber and plastics are checked. It is economical but surface finish and roughness can affect the result.

37. **(b)**

Types of inspection of standard sampling plan are Normal inspection, Tightened inspection and Reduced inspection.

1. Normal inspection is used at the start of inspection unless otherwise directed by the responsible authority. As long as the product quality level is at AQL or better, Normal inspection continues.
2. Tightened inspection is used when recent quality history of the producer shows deterioration. This forces vendors to submit products at a quality level that is at least equal to the AQL.
3. Reduced inspection is used when the producer's recent quality history has been outstanding. Reduced inspection uses a smaller sample size and cuts inspection costs.

38. (b)

If the lot of quality p and the probability of acceptance is P_a, then the average total inspection per lot for single sampling plan is:

$$ATI = n + (1 - P_a)(N - n)$$
$$= 89 + (1 - 0.9397) \times (10000 - 89)$$
$$ATI = 687$$

40. (c)

$$R_1 = 0.9, R_2 = 0.8, R_3 = 0.7, R_4 = 0.8$$

R_1, R_2, R_3 are in series:

$$R_{1s} = R_1 \times R_2 \times R_3 = 0.9 \times 0.8 \times 0.7$$
$$R_{1s} = 0.504$$
$$R_4 = 0.8$$
$$\therefore \quad R_s = 1 - (1 - R_{1-s}) \times (1 - R_4) = 1 - (1 - 0.504) \times (1 - 0.8)$$
$$R_s = 0.9008$$

Reliability of whole system is 90%.

41. (c)

$$\text{Total time of operation} = 1000 \text{ hours} \times 20 \text{ units}$$
$$= 20000 \text{ unit hours}$$
$$\text{Non-operating time} = 800 \text{ hours for the first unit} + 400 \text{ hours for the second unit}$$
$$= 1200 \text{ unit hours}$$
$$\text{Operating time} = \text{Total time} - \text{non operating time}$$
$$= 20000 - 1200 = 18800 \text{ unit hours}$$

43. (d)

- Sustainable development is the organizing principle for meeting human development goals while simultaneously sustaining the ability of natural systems to provide the natural resources and ecosystem services based upon which the economy and society depend.
- The Sustainable Development Goals (SDGs), also known as the Global Goals, were adopted by all United Nations Member States in 2015 as a universal call to action to end poverty, protect the planet and ensure that all people enjoy peace and prosperity by 2030. Climate actions, life on land and life below water are among the 17 SDGs adopted by the United Nations.
- The definition of sustainable development is often attributed to the Brundtland Commission [formally known as the World Commission on Environment and Development (WCED)]. The Commission published its final report published in October 1987 called Our Common Future, also known as the Brundtland Report. It defined sustainable development based on intergeneration equity also.

44. (d)

- India is a party to five major international conventions related to Wildlife conservation, viz. Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), the International Union for Conservation of Nature (IUCN), the International Whaling Commission (IWC), United Nations Educational, Scientific and Cultural Organization-World Heritage Committee (UNESCO-WHC) and the Convention on the Conservation of Migratory Species of Wild Animals (CMS).
- Apart from this, India is also a Party to United Nations Convention to Combat Desertification (UNCCD).

45. (b)

The Plastic Waste Management (Amendment) Rules, 2018 aim to:

(i) Increase minimum thickness of plastic carry bags from 40 to 50 microns and stipulate minimum thickness of 50 microns for plastic sheets also to facilitate the collection and recycling of plastic waste.

(ii) Expand the jurisdiction of applicability from the municipal area to rural areas, because plastic has reached rural areas also.

(iii) To bring in the responsibilities of producers and generators, both in plastic waste management system and to introduce collect back system of plastic waste by the producers/brand owners, as per extended producers' responsibility.

46. (c)

Bioremediation is the use of living organisms, primarily microorganisms to degrade environmental contaminants or pollutants into less toxic forms. It uses naturally occurring bacteria and fungi or plants to degrade or detoxify substances hazardous to human health and the environment.

47. (b)

The Global Warming Potential (GWP) was developed to compare the global warming impacts of different gases. Specifically, it is a measure of how much energy the emissions of one tonne of a gas will absorb over a given period of time, relative to the emissions of one ton of carbon dioxide. The larger the GWP, the more that a particular gas warms the Earth compared to carbon dioxide over that time period.

GHGs		Global Warming Potential (GWP)
Carbon Dioxide (CO_2)	$\rightarrow$	1
Methane (CH_4)	$\rightarrow$	25
Perfluorocarbons (PFCs)	$\rightarrow$	7400 – 12200
Sulfur Hexafluoride (SF_6)	$\rightarrow$	22800

49. (a)

Hydroponics is a method of growing plants without soil in which plants get their nutrients from a mineral solution. The method is suitable for growing plants and herbs as they don't have deep roots. Tomatoes and strawberries are other popular items.

51. **(a)**

The edge effect is an ecological concept that describes how there is a greater diversity of life in the region where the edges two adjacent ecosystems overlap, such as land/water, or forest/grassland. Basically, it refers as changes in population or community structures that occur at the boundary of two or more habitats.

52. **(b)**

First generation ethanol is made from the sugars and vegetable oils found in arable crops, whereas second generation ethanol is made from lignocellulosic biomass or woody crops, agricultural residues or waste.

53. **(c)**

- **Dry bulb temperature:** The Dry Bulb Temperature refers basically to the ambient air temperature. It is called dry bulb because the air temperature is indicated by a thermometer not affected by the moisture of the air.
- **Wet bulb temperature:** The Wet Bulb temperature is the temperature indicated by a moistened thermometer bulb exposed to the air flow.
- **Dew point temperature:** The Dew Point is the temperature at which water vapor starts to condense out of the air. Above this temperature the moisture will stay in the air.
- **Absolute temperature:** Absolute zero is the lowest possible temperature where nothing could be colder and no heat energy remains in a substance. It is also known as thermodynamic temperature.

55. **(b)**

Directing is described as coordinating and organizing the staff and the work.

56. **(b)**
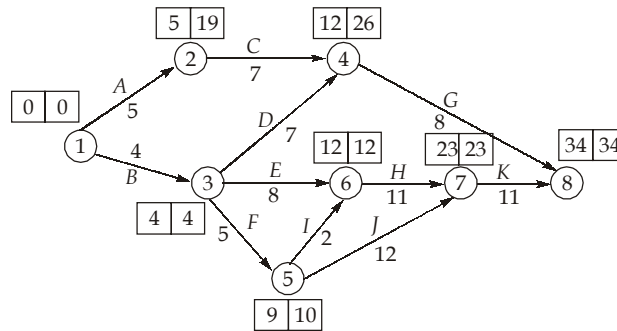
Sub processes of planning process includes:

1. Identify phase objectives.
2. Develop build method.
3. Check resource availability.
4. Develop execution strategy.
5. Develop project schedule.

57. **(b)**

If CPI < 1 physical progress is being accomplished at a greater cost.

CPI > 1 Physical progress is being accomplished at a lesser cost.

59.   **(c)**

65.   **(a)**

- Diamond crystal structure is a variant of zinc blende, in which Carbon atoms occupy all positions (both Zn and S).
- Diamond has very high thermal conductivity and very low electrical conductivity.

68.   **(d)**

These materials have the property that they retain a considerable portion of magnetism after the magnetising force has been removed i.e., they do not get demagnetized easily. These materials have high permeability, high coercive force, high curie temperature.

69.   **(c)**

When a specimen carrying a current I is placed in a transverse magnetic field B, then a potential is developed in the specimen perpendicular to both I and B, which is called hall effect.

70.   **(b)**

Arsenic is pentavalent impurity so n-type semiconductor will be produced.

71.   **(b)**

Since mobility (μ) $\propto$ relaxation time (τ).
So as τ increase μ increases.

72.   **(a)**

The field in a solenoid is given by

$$H = \frac{NI}{l}$$

$$N = \frac{Hl}{I} = \frac{10 \times 10^3 \times 0.3}{1}$$

$$N = 3000 \text{ turns}$$

74.   **(b)**

A Wi-Fi standard enabling devices to easily connect with each other without requiring a wireless access point is called as Wi-Fi Direct which was initially called Wi-Fi P2P (Peer to Peer).

75.   (a)

Video editor is an application software.

78.   (a)

 An SSL layer uses public key encryption, i.e. asymmetric key encryption.

83.   (b)

External conflicts are not covered in ethical codes.

85.   (d)

Some of the common foundational values in both personal and professional life are wisdom, creativity, freedom, love, etc.

92.   (c)

Failures during the infant mortality phase are highly undesirable and are always caused by defects and blunders such as material defects, design blunders and errors in assembly.

93.   (b)

- Burning of biomass does not increase atmospheric carbon dioxide because biomass is formed by atmospheric carbon dioxide and the same amount of carbon dioxide is released on burning.
- Biomass is renewable and is abundantly available on the Earth in the form of firewood, agricultural residues, cattle dung, organic garbage, etc.

96.   (d)

- The greater the difference in electronegativity the more ionic the bond.
- The smaller the difference in electronegativity, the greater the degree of covalency.
- Ionic bonds are non-directional in nature.

99.   (c)

Honesty and confidentiality cannot complement to each other in most of the professional duties.

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