ACE
Engineering Academy

ESE- 2018 (Prelims) - Offline Test Series   Test-23

GENERAL STUDIES & ENGINEERING APTITUDE

FULL LENGTH MOCK TEST- 2 (PAPER- I)
SOLUTIONS

01. Ans: (b)
Sol: Mangroves are *plants/shrubs* which are salt tolerant in nature. Currently in India Mangrove Ecosystem is fastly degrading. To stop that degradation, Maharastra came out with such initiatives.

02. Ans: (d)
Sol: → Mission electrification is an initiative of the ministry of Railway to reduce dependence on diesel of railway. The aim is to speed up the present average rate of electrification of 1700 route kilometres(RKM) per year to 4000 RKM/year by 2018 and subsequently to 6000RKM/year by 2020. By this Indian Railways plan to electrify 90% of its route so as to decrease the dependency on the diesel for the traction purposes.
→ Rail saver is an app which helps officials to track their Division's and substation's energy consumption and energy trends which will further help them to develop strategies for energy conservation.

03. Ans: (a)
Sol: Maharashtra is the first state to adopt Fly Ash utilization policy.

04. Ans: (b)
Sol: Suryamitra initiative is also a part of Make in India. Suryamitra course is a 600 hours (i.e. 3 months) skill development program designed to create skilled manpower in installation, commissioning, and Operation & Maintenance of solar power plants and equipment. The course is jointly designed by MNRE and NISE. The objective of this program is to provide employability and entrepreneurship to rural and urban youth & women. Special emphasis is given to skill youth from SC/ST/OBC categories. The qualification required to participate in the program is ITI (Electrical & Wireman) / Diploma in Engineering (Electrical, Electronics & Mechanical). Higher qualified participants such as B.Tech etc are not eligible. The course teaches the basics of electrical, SPV applications and solar power plant including standards, preventive maintenance, trouble shooting etc.

Suryamitra" is a residential program which is 100% funded by Govt. of India and implemented by NISE across the country.

05. Ans: (a)

06. Ans: (b)

Sol: It is the engineer's responsibility not only to develop safer products but also to prevent the possible misuses or abuses of the products of technology.

Exploring alternative and potentially profitable designs is not a step followed by engineer to ensure safe design. Hence statement (3) is wrong.

07. Ans: (b)

Sol: Agreement signed for employment that are governed by law is called statutory law. Agreement signed on the basis of mutual commitment is called Contractual agreement. Agreement that is expected not to be violated or broken is called Obligatory agreement. Agreements cannot be implied or assumed.

08. Ans: (d)

09. Ans: (c)

Sol: The above are three of the six quality measures of governance. They are,
1. Voice and accountability
2. Political stability and absence of violence
3. Government effectiveness
4. Regulatory quality
5. Rule of law
6. Control of corruption
Hence option (c) is wrong.

10. Ans: (c)   11.   Ans: (d)

12. Ans: (a)

13. Ans: (d)

Sol: Schedule variance
    = Earned value – Planned value
    = 5400 – 6000 = –600
    Cost variance = Earned value – Actual cost
        = 5400 – 7000
        = –1600

14. Ans: (a)

Sol: Constantan is an alloy of copper and Nickel this alloy used in thermocouples and standard rheostats.

15. Ans: (b)

Sol: Electronic polarizations is due to the displacement of centre of electron cloud around the nucleus under the applied field
    Ionic polarization occurs in ionic material as the applied electric field displaces the cations & anions in opposite direction.
    Orientational polarization occurs in a materials having asymmetric arrangemented of atoms.
    Special polarization arises from the acuumilation of charge at crystallographic imperfection region.

16. Ans: (c)

Sol: Creep is the deformation of material with respect to time at constant load and constant room and/or high temperature.

17. Ans: (d)

Sol: The fuse material must possess low melting point temperature because it requires to break the circuit of electrical lines to avoid accidents.

18. Ans: (a)

Sol:
- Sketches are built during Conceptual design
- Assembly drawings are built during Embodiment design
- Detail Drawings are built during Detail design
- Part Drawings are an example of detail drawings

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19. Ans: (c)
Sol:
- Improper Maintenance leads to gradual damage of the equipment.
- Not training Employees properly can lead to accidents or damages.
- Hazards can lead potential accidents.

20. Ans: (b)
Sol: Virtual reality refers to computer technologies that uses virtual reality headset to generate images, sounds and other sensation that replicate a real environment that can be used in training and education. Hence statement (2) is correct, and for simulating this we need a language called as Virtual reality modelling language (VRML)

21. Ans: (c)
Sol: RAM is a volatile memory so, if there is no electricity it does not contain memory. So it is temporary storage. Hence statement (2) is incorrect. ROM is written by manufacturer, user can not change it, so
Statement (1) is incorrect.
Blue-ray uses blue –laser, and stores data
It is an optical storage device, which stores data as a pattern, hence both statements (3) and (4) are corrects.

22. Ans: (b)
Sol: First statement project is caused as CARD while third statement project is Aakashganga hence (1) and (3) statements are incorrect.
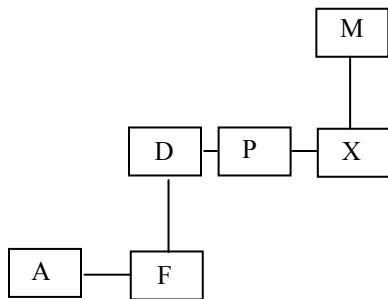Statement (2) is correct.

23. Ans: (b)
Sol: Digital India will bridge the differences of Digital division to ensure that government services reach every household, it is mostly for citizens and for business and industry. So statement (1) and (2) are correct.

24. Ans: (a)
Sol:

A and F are children's of D
P is brother of D
So A's uncle is P

25. Ans: (b)
Sol: Let length of train B = 'x' m

Then, length of train A = $\dfrac{'3x'}{4}$ m

Note: To cross a pole, a train has to travel a distance equal to its own length.

Now, Speed of train A = $\dfrac{D}{T} \Rightarrow \dfrac{\left(\dfrac{3x}{4}\right)}{33}$

$\Rightarrow \dfrac{x}{44}$ m/sec

Speed of train B = $\dfrac{D}{T} \Rightarrow \dfrac{x}{55}$ m/sec

Ratio of speeds = $\dfrac{x}{44}$: $\dfrac{x}{55}$

or

$\dfrac{1}{4}$: $\dfrac{1}{5}$ or 5 : 4

26. Ans: (b)
Sol: Give Dice is general Dice.
opposite faces are
4-oppsite -6
3-oppsite -5
1-oppsite -2

27. Ans: (b)
Sol: It is professional rule of practice not to get work from the organization where his employer is director. Educating students is an obligation that an engineer is ought to fulfill. Engineer is responsible for public safety, preserving the dignity and standards of profession and respect to the organization. However, paying any money other than stipulated fees in any form to get work is considered fraudulent. Hence (b) is false.

28. Ans: (d)
Sol: An ethical engineer concerned about eh environment is expected to fulfill all the above obligations. In addition to the above, the engineer is also expected to create environmental awareness among public at all levels.

29. Ans: (a)

30. Ans: (d)
Sol: (a) and (b) belong to the attribute of Conscientiousness; (c) describes moral autonomy
Comprehensive perspective means having complete knowledge of the consequences of a technology and not forgetting to focus on negative impact of technology

31. Ans(c)
Sol: All the four factors are taken care of by standardization of engineering practices and ensure public safety while preserving healthy competition in the market place

32. Ans: (a)
Sol: Bioremediation is mostly used to treat oil spills and sewage treatment.

33. Ans: (c)
Sol: Coal bed methane is also known as sweet gas because of lack of H_2S. It is clean and environmentally safe.
It increase the risk of disaster due to presence of this gas.

34. Ans: (b)   35.   Ans: (d)

36. Ans: (c)

37. Ans: (c)
Sol: Completely reversible loads are more dangerous because of more stress amplitude and materials are designed based on there loads only. Fluctuating loads are more safer because of low stress amplitude. Alternating loads varying both direction and magnitude.

38. Ans: (c)
Sol: $\sigma = ne(\mu_e + \mu_h)$
$= 4 \times 10^{19} \times 1.69 \times 10^{-19} (0.06 + 0.022)$
$= 0.55 \ (\Omega - m)^{-1}$

39. Ans: (c)
Sol: For diamagnetic material, magnetic susceptibility is negative and its value is less than vacuum.

40. Ans: (c)
Sol: Electrical conductivity of a material decreases with
(1) Increasing temperature
(2) Adding impurities
(3) Hard drawn operation
Pure upper material have higher conductivity than hard drawn and alloying copper material

41. Ans: (a)
Sol: $l_i = 10$ mm
$l_f = 8$ mm
Ductility is measured by percentage decrease in cross sectional area

Ductility $= \dfrac{A_i - A_f}{A_i} \times 100$

$= \dfrac{d_i^2 - d_f^2}{d_i^2} \times 100$

$= 1 - \left[\left(\dfrac{d_f}{d_i} \right)^2 \right] \times 100$

$= \left[1 - \left(\dfrac{8}{10} \right)^2 \right] \times 100 = 1 - 0.64$

$= 36\%$

42. Ans: (c)
Sol: AOA network structure is suitable for analytical, optimization and probabilistic formulations. While AON network structure is suited for Construction projects. Hence statement (2) is wrong.

43. Ans: (c)
Sol:

Path	Duration
A – B – D	8
A–B–Dummy–E	10
A–C–E	9

For crashing purpose:

Option (critical activity)	Cost slope (Rs/day)
A	250
B	120
E	90

Minimum amount to be spent to reduce the project duration by 1 day = Rs.90.

44. Ans: (d)   45.   Ans: (a)

46. Ans: (c)
Sol: Traces obtain when the line is inclined to or Perpendicular to the reference line XY.

47. Ans: (a)
Sol: As per Bureau of Indian Standards, IS: 10714 the sides of drawing sheets are followed by $1:\sqrt{2}$. The surface area of A0 sheet is $1m^2$ and A4(not A3) sheet is recommended for vertical type.
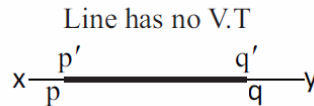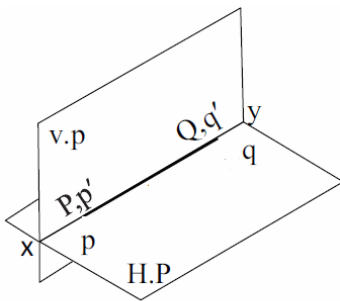
48. Ans: (c)
Sol: Cutting a cone greater than half of the apex angle, then True shape of section is ellipse with eccentricity less than 1.
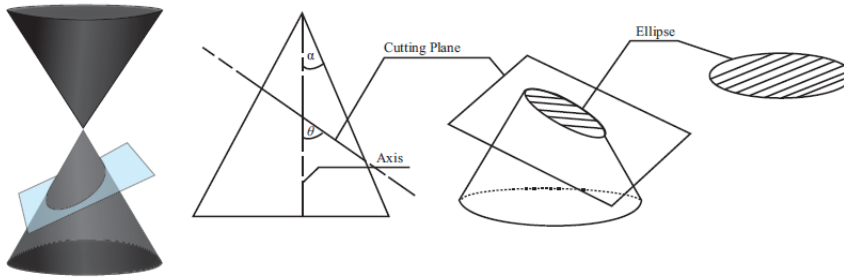
49. Ans: (a)
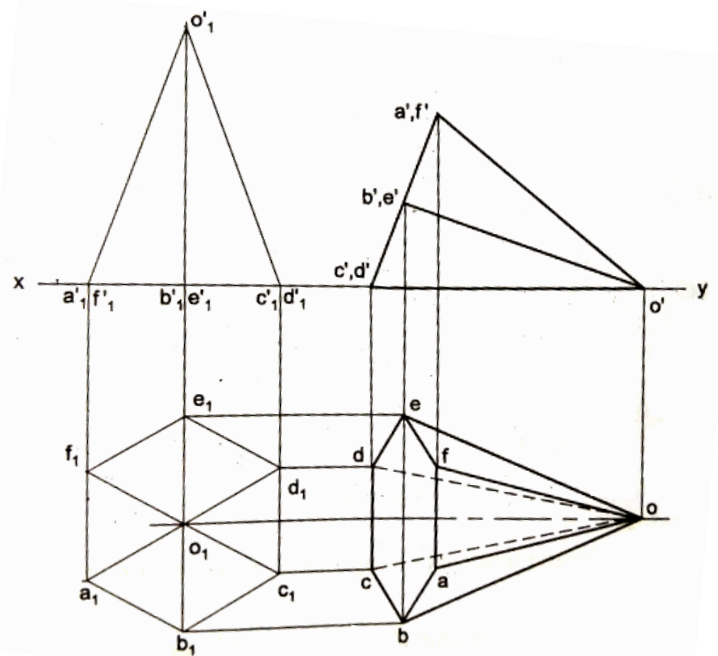Sol: Both front View and top coincides with the reference line.

50. Ans: (c)
Sol: Projections of a point are always lying on the same vertical line and elevation which appears on the vertical plane is defined with the horizontal plane.

51. Ans: (b)
Sol: The number of dotted lines in its top view is 2

52. Ans: (b)
Sol: For the first time in the history of the WTO 119 WTO members and observers agreed to support the 'Buenos Aires Declaration on Women and Trade', which seeks to remove barriers to, and foster, women's economic empowerment." Hence Statement (1) is correct.
However, India, an influential WTO member, was among the minority group that chose not to endorse the move saying while it stoutly supports gender equality, it cannot concur with the view that gender is a trade-related issue. Hence statements 2 & 3 are incorrect.

53. Ans: (b)   54. Ans: (c)

55. Ans: (a)   56. Ans: (c)

57. Ans: (b)
Sol: Pressure check valves are installed on the Pneumatic equipment to keep a check on the air pressure so that the pressure does not exceed the threshold pressure of the equipment. So this is an example of failsafe design.

58. Ans: (d)
Sol: Design Testing uses the following approaches:
    1. Design Mockups
    2. Design Models
    3. Prototypes or Comprehensive Prototypes or Beta Prototypes
    4. Virtual Prototypes.

59. Ans: (c)
Sol: Methods for generation of ideas in design:
    1. Brainstorming
    2. Brain-Writing
    3. Synectics
    4. Concept Mapping

60. Ans: (d)
Sol: Implementation Plan is used in Finding and Implementing a Solution.

61. Ans: (a)

62. Ans: (c)
Sol: KAIZEN reduces 6 types of waste to improve customer satisfaction. It improves safety for worker. It also simplifies work process considering ergonomics .

63. Ans: (b)
Sol: It is done after design is developed, but gives go ahead after eliminating top priority reasons for potential failures.

64. Ans: (a)
Sol: RPN = Severity × Level of detection × Likelihood
Based on RPN, reasons for potential nodes of failure are prioritised and eliminated.

65. Ans: (c)
Sol: $[3M + 4W] \rightarrow 5$ days $\rightarrow$ ①

$[5M + 15W] \rightarrow 2$ days $\rightarrow$ ②

$[10M + 5W] \rightarrow ?$ days $\rightarrow$ ③

From ① and ② , Apply chain rule, and find relation between men and women
$[3M + 4W] = [5m + 15w]2$
$15m = 20w = 10m + 30 w$
$5M = 10W$
$1M = 2W$
The relation substitute in ① and ③ and also relation change women
$3M + 4W - 5$
$3[2] + 4W = 5$
$10W + 5$ days $\rightarrow$ Ⓐ
$10M + 5W \rightarrow ?$
$10[2] + 5w \rightarrow ?$

$25w - ? \rightarrow$ Ⓑ
From Ⓐ and (Ⓑ
$10W - 5$ days
$25W \rightarrow ?$
$10[5] = 25 [X]$
So x = 2 days

66. Ans: (c)
Sol:

B[male]   F[male]

C[lady]   H[male]

E[male]   D[lady]

A[lady]   g[male]
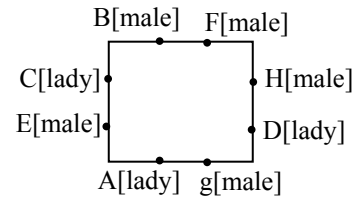
67. Ans: (a)
Sol: Alternative series
$[+1, -1, +1, -1\ldots..]$

DRINK   WATER
EQJML XZUDS

68. Ans: (b)
Sol:

Poets
Answers
Questions   writers
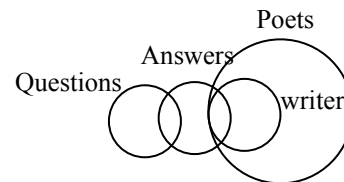
This type of problem don't give information we need conclusion.
don't use may be or may not
Only (1) and (4) conclusion

69. Ans: (a)
Sol: $5 - 3 = 2 \rightarrow 2^3 = 8$
$4 - 1 = 3 \rightarrow 3^3 = 27$
$6 - 2 = 4 \rightarrow 4^3 = 64$
$8 - 2 = 6 \rightarrow 6^3 = 216$

70. Ans: (b)

Sol: 5G provides speed range from 1 Gbps to 10 Gbps. So statement (1) is incorrect with this much speed word wide web would be functioning as wirelessly, hence it will support wireless world wide web (WWW).

71. Ans: (c)

Sol: GSM stands for Global System for Mobile communication.
Which mainly focused for voice communication not for data communication and it is standard for mobile communication.

72. Ans: (d)

Sol: Modem (modulator – Demodulator) It converts digital to analog and analog to-digital signals such that computer can easily sends the signals hence option (d) is correct.

73. Ans: (d)

Sol: Simplex provides one way transmission. hence only one node can transmit the data.
The full duplex is a both way transmission at some time, while half duplex is a both way transmission but not at the same time.

74. Ans: (c)

Sol:
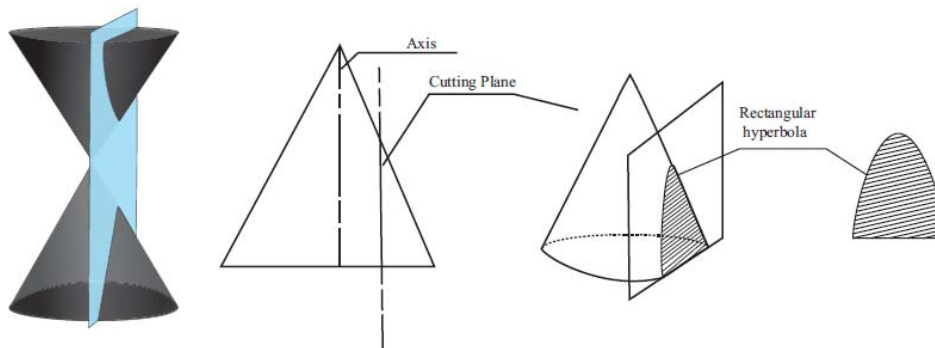
75. Ans: (b)

Sol; Side view is always beside the front view; if the top view and front view are above the reference line then the object lies in Second quadrant.

76. Ans: (c)

Sol: Consider the matrix $A = \begin{bmatrix} 1-t & 0 & 0 \\ 1 & 1-t & 0 \\ 1 & 1 & 1-t \end{bmatrix}$

If the vectors are linearly dependent, then
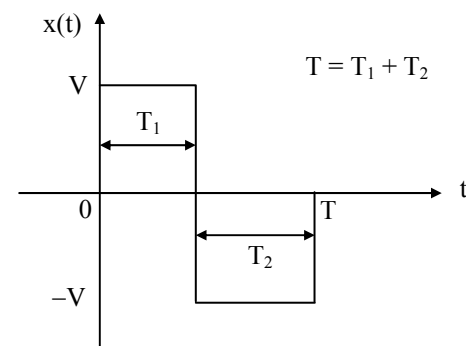$|A| = 0$
$\Rightarrow (1-t)^3 = 0$
$\Rightarrow t = 1$

77. Ans: (a)

Sol: The rectangular wave of period T for $0 < t < T$ is shown in Fig.1

Fig.1

$$\text{RMS value} = \sqrt{\frac{1}{T}\int_0^T x^2(t)\,dt}$$

$$= \sqrt{\frac{1}{T}\left[V^2 T_1 + V^2 T_2\right]}$$

$$= V$$

78. Ans: (c)
Sol: The trigonometric Fourier series of an even
     function does not have sine terms, which are
     odd functions. It has cosine terms which are
     even functions. It has a d.c term if its
     average value is finite. It has no d.c term if
     its average value is zero.

79. Ans: (c)
Sol: P(student studied & passed) = 0.75×0.9
        P(student passed without studying)
               = 0.25×0.2
     Required probability
     = $0.9 \times 0.75 + 0.2 \times 0.25 = 0.725$

80. Ans: (a)
Sol: $\sum (x_i - \bar{x}) = \sum (x_i) - n\bar{x} = n\bar{x} - n\bar{x} = 0$

81. Ans: (a)
Sol: $f(z) = z^4 + 3z^2$ is a polynomial which is
     analytic everywhere.

82. Ans: (b)

Sol: $A = \begin{bmatrix} 0 & 2 & 4 \\ 1 & 1 & 3 \\ 1 & 3 & 7 \\ 1 & 5 & 11 \end{bmatrix}$

     $R_1 \leftrightarrow R_2$
     $\begin{bmatrix} 1 & 1 & 3 \\ 0 & 2 & 4 \\ 1 & 3 & 7 \\ 1 & 5 & 11 \end{bmatrix}$

     $R_3 - R_1$
     $R_4 - R_1$
     $\begin{bmatrix} 1 & 1 & 3 \\ 0 & 2 & 4 \\ 0 & 2 & 4 \\ 0 & 4 & 8 \end{bmatrix}$

     $R_3 - R_2$
     $R_4 - 2R_2$
     $\begin{bmatrix} 1 & 1 & 3 \\ 0 & 2 & 4 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \end{bmatrix}$

     $\therefore \rho(A) =$ Number of non-zero rows
     $\therefore \rho|A| = 2$

83. Ans: (b)
Sol: Since the curve intersect x-axis in '3' times
     for $0 \le x \le 5$. So, we have '3' real roots.

84. Ans: (c)
Sol: While QFD and FMEA are done to reduce
     costly late design changes, their complete
     elimination is not possible. Hence statement
     (2) is wrong.

85. Ans: (c)
Sol: In SMED, to reduce the setup time and cost,
     Heavy investment is not encouraged in any
     particular stage. Hence statement (3) is
     wrong.

86. Ans: (d)
Sol: Quality Circle (QC) does not seek to change
     the roles of employees but seeks to change
     the attitude of employees. Hence statement
     (1) is wrong.

87. Ans: (d)
Sol: Zero defects theory is based on four
     elements for implementation in real
     projects.
     1. Quality is a state of assurance to
         requirements. Therefore, zero defects
         in a project means fulfilling
         requirements at that point in time.
     2. Right the first time. Quality should
         be integrated into the process from
         the beginning, rather than solving
         problems at a later stage.

3. Quality is measured in financial terms. One needs to judge waste, production and revenue in terms of budgetary impact.
4. Performance should be judged by the accepted standards, as close to perfection as possible.
All the statements are elements of zero defect theory proposed by Crosby.

88. Ans: (b)
Sol: Meghalaya is the first state in India to operationalise a law that makes social audit of government programmes and schemes a part of government practice and has the following three main features.
1. It will make it easier to correct course as the scheme is rolling along; the audit is not after all the money has been spent.
2. It gives people a direct say in how money will be spent and fills an information gap for officers as they are directly in touch with the ground.
3. Social audits which hitherto have been civil society initiatives rather than government-mandated are now part of the system.

89. Ans: (a)

90. Ans: (c)
Sol: NABARD was established on the recommendations of B.Sivaraman Committee. Hence statement (1) is wrong.

91. Ans: (a)
Sol: Eutrophication is a gradual increase in biological productivity of an aquatic ecosystem with time. Direct and indirect ecological impact of nutrient enrichment includes increased primary productivity.

92. Ans: (a)   93.   Ans: (c)

94. Ans: (a)
Sol: Digilocker uses cloud and digital signature technology which helps the citizens to upload the documents directly to their accounts.

95. Ans: (a)
Sol: Both the statements are true. Virtues are qualities attributes that need to be practiced for balanced behavior of humans. Balanced behavior is not defined by any religion. However, the teacher while practicing the conduct defined by the religion to which the teacher belongs work as undercurrent in influencing the learner to follow virtues as per the religious practices of the teacher thus developing a value system in the individual based on observations and beliefs.

96. Ans: (c)
Sol: Statement (I) is true since duty theory is based on rationality and autonomy of human beings to impose on oneself the duty of acting to serve others. However, statement (II) is false since committing suicide is not a duty either to self or others.

97. Ans: (a)
Sol: The Gray castiron material consists of graphite flakes within peralite and cementite. Due to presents of there flakes the gray castiron possess high damping capacity and they can transfer vibrations from machine tool to the earth.

98. Ans: (b)
Sol: Nano material is defined as atleast one dimension at a material is in nano scale i.e., varying from 1 nm to 100nm.
The nano material properties are completely different from bulk form because of large surface Area to volume ratio and change in energy band structure of nano material.

99. Ans: (d)

Sol: Make or Buy Decision happens in Detail design stage of the design process. So Statement (I) is incorrect.

Statement (II) explains Make or Buy Decision.

100. Ans: (b)