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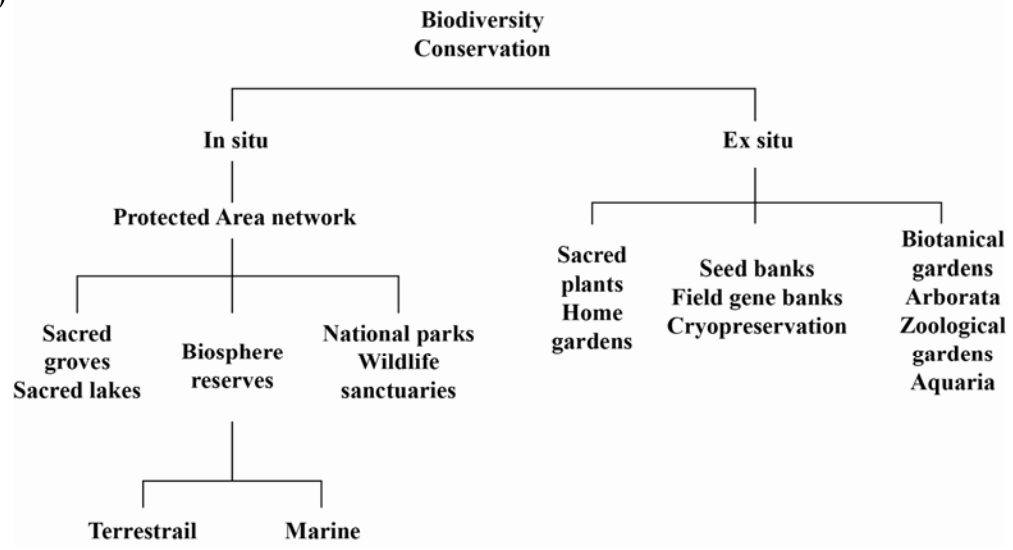
ESE- 2018 (Prelims) - Offline Test Series **Test-21**
GENERAL STUDIES & ENGINEERING APTITUDE

FULL LENGTH MOCK TEST- 1 (PAPER- I)
SOLUTIONS

01. Ans: (a)
Sol: Some examples of human modified ecosystems are:
(1) Agro-ecosystems
(2) Plantation forests
(3) Urban ecosystems
(4) Rural ecosystems
(5) Aquaculture
(6) Industrial areas
(7) Laboratory cultures

02. Ans: (d)
Sol: Bio-mass → degradation takes place → in absence of oxygen(anaerobic) → biogas
03. Ans: (c)
04. Ans: (c)
Sol: The temperature and rainfall decreases as one moves from lower latitude to higher latitudes. Hence the decrease in biodiversity. It is the same with mountain gradients.

05. Ans: (c)
Sol:



06. Ans: (c)
Sol: Public's view of risk does not look for any compensation or benefits. Public expect that

risk is well informed one and is equally distributed.



07. Ans: (d)

Sol: False whistle blowing should be avoided in all probability. It damages not only the credibility of the whistle blower but also causes loss in terms of reputation of the organization and the consequent financial losses.

08. Ans: (b)

Sol: As the name implies, human centered environmental ethics gives significance to only human needs and comforts. It assumes that other things in the nature are only instrumental and hence are meant to serve the purpose of humans only. Hence this is false.

09. Ans: (a)

Sol: Ethical conduct not about following the competitors

10. Ans: (d)

Sol: An attempt to encourage investigate ethical behavior of employees by other colleagues is unethical behavior in itself.

11. Ans: (b)

Sol: List-II deals with contributing on western quality Gurus mentioned in List-I.

12. Ans: (b)

Sol: Advantages of “5S” are less waste, reduced space used, improved maintenance, improved safety and quality and committed employees.

13. Ans: (d)

Sol: KANBAN is flexible. It focuses on continuous delivery. It reduces wastes like over production, defects, waiting and unnecessary motion.

14. Ans: (a)

Sol: “5 Whys” technique determines relationships between different root causes. It is a qualitative tool which works best deals with problems involving human interactions.

15. Ans: (d)

Sol: By focussing on significant few (20%) reasons, quality can be drastically improved (errors are reduced by 80%)
→ ABC(Always Better Control) used in inventory classification is modelled on Pareto chart.

16. Ans: (a)

17. Ans: (c)

18. Ans: (a)

19. Ans: (b)

Path	Duration	
A-D-G	3 + 3 + 3 = 9	
A-C-E-F	3 + 2 + 4 + 3 = 12	→ Critical path
A-C-F	3 + 2 + 5 = 10	
B-E-F	4 + 4 + 3 = 11	
B-F	4 + 5 = 9	

Project completion time
= Critical path duration = 12

20. Ans: (b)

Sol: Let distance covered = d km

Now, $T_1 - T_2 = 2$ hr

$$\frac{d}{10} - \frac{d}{15} = 2$$

∴ d = 60 km

At speed of 10 km/hr, it takes 6 hr to reach the destination at 1 pm.

i.e. starting time = 1 pm – 6 hr = 7 am
to reach at 12 noon, it requires 5 hrs starting at 7 am.

$$\therefore \text{Speed required} = \frac{D}{T} = \frac{60}{5} = 12 \text{ km/hr}$$

Pre GATE-2018

COMPUTER BASED TEST

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21. Ans: (c)

Sol: Here, $p^3 + q^3 - r^3 = (p + q)(p^2 + q^2 - pq) - r^3$
 $= (p + q)[(p + q)^2 - 3pq] - r^3$
 $= r[r^2 - 3 \cdot \frac{30}{r}] - r^3 = r^3 - 90 - r^3 = -90$

[substitute $p + q = r$ and $pq = \frac{30}{r}$]

22. Ans: (a)

Sol: Ratio of efficiency (P & Q) = 2 : 1
Ratio of efficiency (P + Q, R) = 3 : 1

if R does 1 unit work, then P & Q together do 3 units.

Out of 3 units, P does 2 units and Q does 1 unit.

∴ Ratio of efficiency (P, Q & R) = 2 : 1 : 1
Hence earnings should be divided in the ratio is 2 : 1 : 1

23. Ans: (b)

Sol: Out of 100 Students,
60 students play cricket

30 Students play football

10 Students play both.

So, number of students who play neither cricket nor football will be given by

$$= [100 - (60 + 30 - 10)]$$
$$= (100 - 80) = 20 \text{ students}$$

24. Ans: (d)

Sol: This mission is a proper balance between content generation, research and providing training to faculties, which makes statements 1, 2 and 3 are correct statements based on mission.

25. Ans: (c)

Sol: Types of computing which calculates many operations simultaneously called as parallel computing and super computers uses parallel computing this makes statement (1) incorrect, while statement (4) is correct. Statement (2) is the definition of Distributed computing not parallel computing. Hence (2) is also incorrect.



26. Ans: (b)

Sol: NeGP(1.0) was not focusing on new technology like mobile, cloud, NeGP(2.0) which is e-kranti, which has focused on this technology, and it has redefined NeGP.

To redefine NeGP it should be transformation not translation, so statement (1) is incorrect.

27. Ans: (c)

Sol: The neighboring buildings and other geographical elements play a significant role in the design, life and safety of the building

28. Ans: (c)

Sol: First we finalize the ideas for design, then build product architecture, then test a sample of the product and finally build and release the manufacturing drawings or blue prints.

29. Ans: (a)

Sol: The correct order of sequence is
Specifications stage → Concept design →
Embodiment design → Detail Design →
Manufacture Stage → Product usage

30. Ans: (d)

31. Ans: (c)

Sol:

CLASS	FUEL TYPE
CLASS-A	SOLID FUEL: WOOD, COAL, CHARCOAL
CLASS-B	LIQUID FUEL: PETROL, KEROSENE ETC..
CLASS-C	GASEOUS FUEL: LPG, CNG ETC.
CLASS-D	LIQUID METALS: SODIUM, POTASSIUM ETC
CLASS-E	ELECTRICAL EQUIPMENT
CLASS-F	COOKING OILS

32. Ans: (a)

33. Ans: (b)

Sol: Morals are absolute and all the morals have same priority in terms of conduct. Values change from one person to another. As a result, the outcome depends on which action one prefers over the other.

34. Ans: (c)

35. Ans: (a)

Sol: Protecting the environment is prescribed as professional obligation by most of the professional bodies that is expected to be followed by the engineer. Professional bodies expect a responsible conduct of profession by engineers in respect of the environment.

36. Ans: (a)

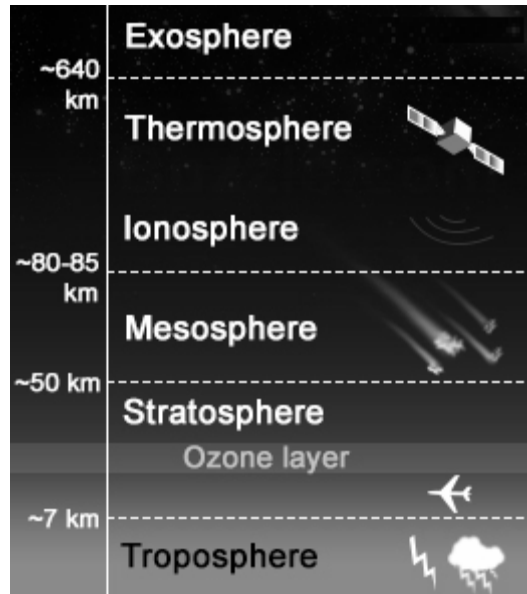
37. Ans: (c)

38. Ans: (b)

39. Ans: (b)

40. Ans: (d)

Sol:





41. Ans: (c)

Sol: $M \times D \times H \Rightarrow 4 \times 4 \times 4$
 $\Rightarrow 64$ man hrs are required for 4 units of work
 i.e. for each unit of work, 16 man hrs are required.
 In the second case, 8 man hrs of work is done in 2 days [$2 \times 2 \times 2 = 8$ man hrs]
 $\therefore \frac{1}{2}$ unit of work is done in 2 days

42. Ans: (d)

Sol: Total number of coins = 50
 Let ₹ 1 coin = x and ₹ 2 coin = y
 so, $x + y = 50$ (i)
 and $x + 2y = 75$ (ii)
 on solving eqs (i) and (ii) will give
 $x = 25$ and $y = 25$

43. Ans: (c)

Sol: In 1972, A was as old as the number formed by the last two digits of his year of birth.
 so, A was born in 1936 (as in 1972, he is 36 yrs older also, last two digits of 1936 are 36).
 Hence, B was born in $1936 + 15 = 1951$
 so, he is 21 yrs old in 1972

44. Ans: (d)

Sol: Square integer 4 $\rightarrow 4(1)$
 Square integer 9 $\rightarrow 4(2) + 1$
 Square integer 16 $\rightarrow 4(4)$
 Square integer 25 $\rightarrow 4(6) + 1$

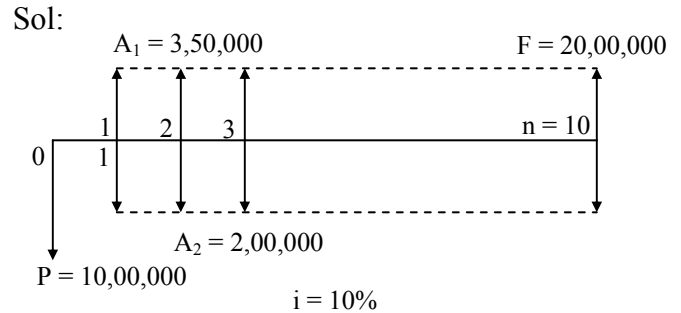
\therefore Every square integer is of the form $(4K)$ or $(4K + 1)$

45. Ans: (b)

Sol: Time taken by A to overtake B = $\frac{\text{distance}}{\text{Speed}}$
 $= \text{i.e. } \frac{\text{distance}}{\text{relativespeed}} = \frac{c}{p-q} \text{ km}$

\therefore Distance travel by A to overtake B
 $= \delta \times T$
 $= p \times \frac{c}{p-q} = \frac{pc}{p-q} \text{ km}$

46. Ans: (a)



Net Present Value (NPV)
 $= -P + (A_1 - A_2) [P/A, i\%, n]$
 $+ F[P/F, i\%, n]$
 $= -10,00,000 + [3,50,000 - 2,00,000]$
 $\times 6.1446 + 20,00,000 \times 0.3855$
 $= -1210$

47. Ans: (c)

48. Ans: (d)

49. Ans: (c)

50. Ans: (c)

51. Ans: (a)

Sol: NDT method is used to analyse the material without damaging the specimen. The analysis of material is type of defects and properties of material, chemical composition and corrosion are material.

52. Ans: (c)

Sol: The ceramic materials have high melting point material. The porcelain ceramic is a good thermal and electrical insulator and hence it is used in spark plugs.

53. Ans: (a)

Sol: German silver is an alloy of copper, zinc & Nickel.



54. Ans: (d)

Sol: The Thomson effect deal with only single metallic rod and not with thermo-couple as in peltier effect and seeback effect.

According to Thomson effect, a conductor has placed in varying temperature along it's length and current is passed through it then it will absorb (or) evolve heat. Absorbing (or) evolving heat will depends on direction of current.

55. Ans: (d)

56. Ans: (c)

Sol: 1. Unstructured Supplementary Service Data (USSD) channel this service allows mobile banking transaction using basic feature mobile phone, there is no need to have mobile internet data facility for using (USSD) based mobile banking.

2. Aadhar Enabled Payment System (AEPS) is bank model which allows us to do transaction at POS with Aadhar authentication.

57. Ans: (a)

Sol: The given frequency as follows:

S-Band (2-4 GHz)

C-Band (4-8 GHz)

KU-Band (12-18 GHz)

KA-Band (26-40 GHz)

So correct option is (a)

58. Ans: (b)

66. Ans: (d)

Sol: Irrespective of the cutting plane angle passing through the apex of a cone, the true shape of the section is a triangle.

Sol: All are different types of cloud except duplex cloud.

59. Ans: (a)

Sol: Bluetooth and WIMAX both uses radio waves which follows omni directional property not line of sight, which is followed by microwave.

60. Ans: (c)

Sol: If N computers are to be connected in Full Mesh topology then we need

$${}^N C_2 = \frac{N(N-1)}{2} \text{ cables.}$$

61. Ans: (b)

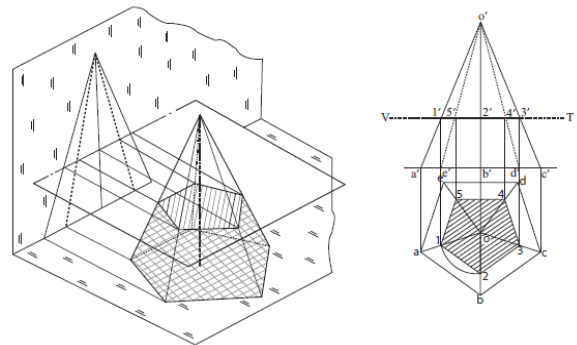
62. Ans: (a)

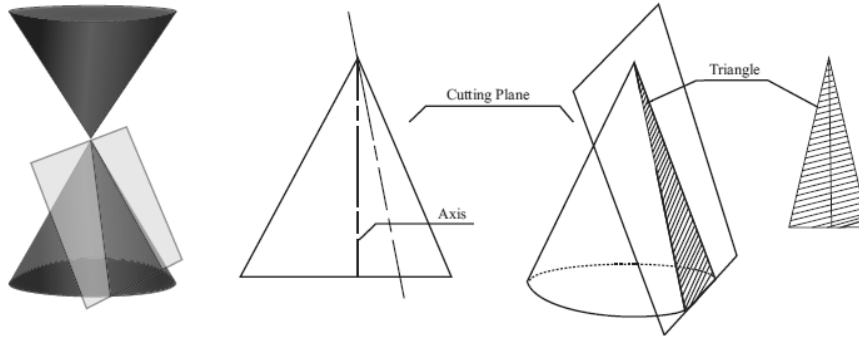
63. Ans: (b)

64. Ans: (a)

65. Ans: (d)

Sol: When a pentagon pyramid is resting on its base on the HP its plan shows the base. It is cut by a section plane parallel to HP and perpendicular to VP then the cutting plane position is called Vertical Trace. The true shape of the section appears from plan.





67. Ans: (b)

Sol: The maximum number of point of intersections by the section plane when it is resting on base in VP is $n+1$, where n is number of sides of base.

68. And: (a)

Sol: When a line is inclined to HP and Parallel to VP, its true length appears in elevation. The elevation for both I and II quadrant it will be above the reference line.

69. Ans: (c)

Sol: The angle between the slant edges is:

$$\theta = \frac{\text{radius}}{\text{slantedge}} * 360^\circ$$

$$= (r/r) * 360^\circ = 360^\circ$$

70. Ans: (c)

Sol: $x + 2y + 3z = \lambda x$

$$2x + y + 2z = \lambda y$$

$$2x + 3y + z = \lambda z$$

$$\left. \begin{aligned} (1 - \lambda)x + 2y + 3z &= 0 \\ 3x + (1 - \lambda)y + 2z &= 0 \\ 2x + 3y + (1 - \lambda)z &= 0 \end{aligned} \right\}$$

$$\begin{vmatrix} 1-\lambda & 2 & 3 \\ 3 & 1-\lambda & 2 \\ 2 & 3 & 1-\lambda \end{vmatrix} = 0$$

$$R_1 \rightarrow R_1 + R_2 + R_3$$

$$\begin{vmatrix} 6-\lambda & 6-\lambda & 6-\lambda \\ 3 & 1-\lambda & 2 \\ 2 & 3 & 1-\lambda \end{vmatrix} = 0$$

$$6-\lambda \begin{vmatrix} 1 & 1 & 1 \\ 3 & 1-\lambda & 2 \\ 2 & 3 & 1-\lambda \end{vmatrix} = 0$$

$$\Rightarrow \lambda = 6$$

71. Ans: (a)

72. Ans: (b)

Sol: Let $u = \tan^{-1} \left(\frac{x^3 y^3}{x^4 + y^4} \right)$

$$\Rightarrow f(u) = \tan u = \frac{x^3 + y^3}{x^4 + y^4}$$

Here, $\tan u$ is a homogeneous function of degree 2.

By Euler's theorem

$$x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} = 2 \frac{f(u)}{f'(u)} = 2 \left(\frac{\tan u}{\sec^2 u} \right) = \sin(2u)$$

73. Ans: (a)

Sol: $f(x, y) = xy + x - y$

$$f_x = y + 1 = 0$$

$$f_y = x - 1 = 0$$

$\therefore P(1, -1)$ is a stationary point

$$r = f_{xx} = 0$$



$$s = f_{xy} = 1$$

$$t = f_{yy} = 0$$

$$rt - s^2 = -1 < 0$$

∴ P(1, -1) is a saddle point

74. Ans: (d)

Sol: The function $f(x) = x \cdot \sin x$ is even function
∴ The fourier series of $f(x)$ contain only cosine terms.
The coefficient of $\sin 2x = 0$

75. Ans: (a)

76. Ans: (d)

81. Ans: (a)

Sol: Circular plate appears as an ellipse with its major axis parallel to both HP and VP only when the sum of the inclinations are equal to 90° . Then its side view appears as a straight line. Elevation and plan looks like a ellipse.

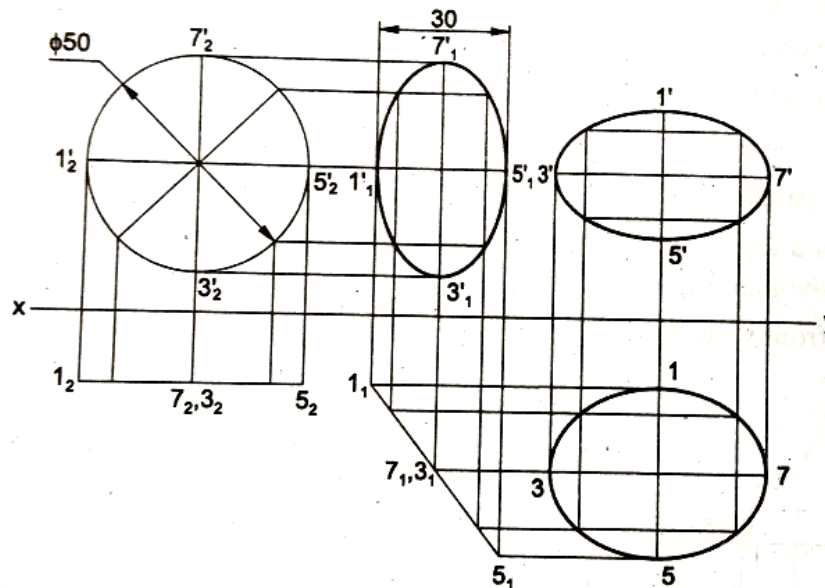
77. Ans: (c)

78. Ans: (b)

79. Ans: (b)

80. Ans: (c)

Sol: BIS recommends to follow aligned dimensioning system, the dimensions are read from the bottom of the drawing sheet or right hand edges.





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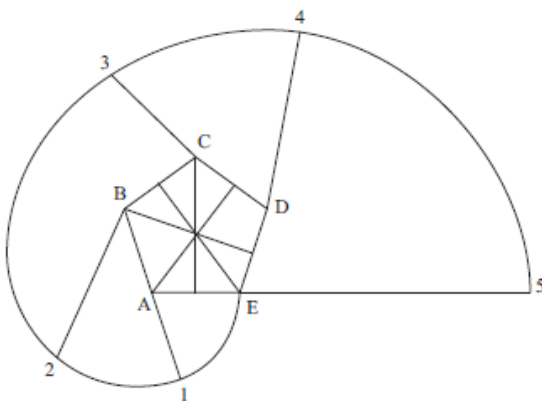
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82. Ans: (d)

Sol: The curve traced by end point of a string when it is unwound tightly from a plane is Involute.



83. Ans: (c)

Sol: For diffraction to occur, the obstacle size should be comparable to wavelength of the incident radiation.

84. Ans: (a)

85. Ans: (a)

Sol: The Susceptibility of diamagnetic materials is independent of temperature.

86. Ans: (c)

Sol: When the ends of a conductor are subjected to a potential difference, a current flows through the conductor. The current through the conductor increases linearly on increasing the voltage.

87. Ans: (d)

88. Ans: (a)

Sol: $f(z) = z\bar{z} = (x + iy)(x - iy) = x^2 + y^2$

$$u + iv = (x^2 + y^2) + i(0)$$

$$u = x^2 + y^2; v = 0$$

$$\frac{\partial u}{\partial x} = 2x; \quad \frac{\partial v}{\partial y} = 0$$

$$\frac{\partial u}{\partial y} = 2y; \quad \frac{\partial v}{\partial x} = 0$$



$$\frac{\partial u}{\partial x} \neq \frac{\partial v}{\partial y} \quad \& \quad \frac{\partial u}{\partial y} \neq -\frac{\partial v}{\partial x} \text{ except at } (0, 0)$$

By def. of Analytic function. It is no-where Analytic function implies no singular points.

89. Ans: (b)

$$\text{Sol: } f(z) = (z-3) \sin \left(\frac{1}{z+2} \right)$$

$$= (z-3) \left[\frac{1}{z+2} - \frac{1}{3!(z+2)^3} + \frac{1}{5!(z+2)^5} - \dots \right]$$

It contains infinite number of terms in principal part of Laurent's series.
Hence $z = -2$ is essential singularity

90. Ans: (b)

$$\text{Sol: } y = 3x_2 - x_1$$

$$v(y) = 9v(x_2) + v(x_1)$$

$$25 - 18 = K$$

$$\Rightarrow K = 7$$

91. Ans: (a)

Sol: Primary source of water pollution are sewage, agri run off, industrial effluents.
Among the above three sewage contribution is major.
The more sewage entering into water bodies B.O.D levels increases i.e. D.O levels increases.

92. Ans: (a)

Sol: With TPM, rate of machine failure decreases and thereby increasing reliability of equipments, with higher reliability, necessity for replacing machines decrease. Also lifespan of equipment is increased through constant monitoring and maintenance.

93. Ans: (d)

94. Ans: (a)

Sol: **4G** is a collection of fourth generation cellular data technologies that provide high data transfer speeds, more the speed higher

the generation, WIMAX provides speed of 10-100 Mbps. So it comes under 4G.

95. Ans: (d)

Sol: Living a decent life is one's right and it is an unalienable right based on rights theory. Right to property is not fundamental or constitutional right and hence statement (II) is correct.

96. Ans: (b)

Sol: Statement (I) is called liability of engineer which is true. Statement (II) is the responsibility of the engineer which is also true

97. Ans: (a)

Sol: In P-type semiconductor, the doping elements are B, Al, Ga, In. They are trivalent elements there donor atoms are deficient in bonding electrons and hence their one of the orbital consists of hole, that is capable of electron from host material.

So that p-type semiconductors electrons participate in bonding and holes are charged carries.

98. Ans: (b)

Sol: Soft magnetic materials are used in magnetic memories in computers because they are easily magnetized and demagnetized with small amount of field coercivity of soft magnets are smaller.

99. Ans: (d)

Sol: Statement (I) is false
Statement (II) is true
Safety is every stakeholders' responsibility

100. Ans: (a)

GATE TOPPERS

GATE 2017

1 EC PRAMOD	1 ME SUDHEER	1 ME HASAN ASIF	1 EE SHIVAM SINGH	1 CE ARJUN RAKESH	1 CS DEVAL N PATEL	1 IN NAVEEN	2 EC SREE KALYANI
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8 PI Anand Upadhyay	9 EC Anand Upadhyay	9 CS Anand Upadhyay	9 ME CHIRAG BANARJEE	10 EC AMIT KAWAT	10 ME ANAND KUMAR	10 EE SURAJ DASH	10 IN ANAND KUMAR

ESE TOPPERS

ESE 2017

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