XAT 2011

Answers and Explanations

1	C	**21**	D	**41**	D	**61**	A	**81**	–	**101**	B
2	B	**22**	E	**42**	A	**62**	E	**82**	B		
3	C	**23**	A	**43**	B	**63**	D	**83**	–		
4	E	**24**	B	**44**	C	**64**	A	**84**	–		
5	A	**25**	C	**45**	–	**65**	B	**85**	D		
6	D	**26**	B	**46**	C	**66**	E	**86**	D		
7	C	**27**	E	**47**	C	**67**	D	**87**	A		
8	B	**28**	D	**48**	E	**68**	E	**88**	E		
9	D	**29**	E	**49**	B	**69**	A	**89**	C		
10	D	**30**	C	**50**	C	**70**	D	**90**	C		
11	A	**31**	E	**51**	D	**71**	E	**91**	B		
12	E	**32**	A	**52**	C	**72**	C	**92**	C		
13	E	**33**	E	**53**	D	**73**	D	**93**	E		
14	E	**34**	D	**54**	D	**74**	C	**94**	B		
15	C	**35**	C	**55**	C	**75**	D	**95**	A		
16	D	**36**	E	**56**	E	**76**	D	**96**	B		
17	A	**37**	E	**57**	E	**77**	C	**97**	C		
18	E	**38**	A	**58**	D	**78**	B	**98**	D		
19	B	**39**	D	**59**	A	**79**	A	**99**	C		
20	B	**40**	C	**60**	A	**80**	E	**100**	B		

1. C Statements 1, 3 and 4 form a mandatory sequence. Statement 2 talks about directors being appointed as fiduciaries and not as agents. The sequence 134 goes on to describe the role of fiduciary as directed by law.

2. B The answer to this question comes from the first line of the poem - " *perhaps this war will pass like the others which divided us"*. We can infer that war divides us (Humanity). The rest of the verse talks about the repercussions of war. It does not tell us what happens after the war. Hence we cannot infer - 'Humanity gets reunited afterwards in peace". All the options except B can be inferred.

3. C The Statement made by P states that the being is unmoved and undisturbed. The arrow is in motion even though it is perceived to be at rest by the fly. Hence it cannot be called 'being'. Statement 1 is not consistent with the views of Paradox. Only statements 4 and 5 are consistent with the views of Paradox.

4. E Refer to the lines-*"All things are in the state of perpetual flux…….. is the underlying principle at work in the universe ."* These lines support the idea of numerous realities as discussed in statement E.

5. A 'Slush' means partly melted snow that is usually dirty. 'Slush' should come in blank 1, which eliminates all the options except A and C. 'Sludge' means thick, soft, wet mud or a substance that looks like it. 'Sludge' should come in blank 2.

6. D Ingenuity means the ability to invent things or solve problems in clever new ways. This best fits blank 2.

7. C The author of the review talks about how the novel has developed and how the concept has been treated. This reviewer, in order to make such a comment, must have read the book properly.

8. B Out of the given options, only B can be objectively validated. Rest are all opinions and cannot be validated.

9. D The reviewer in statement D does not talks about the novel at all but eulogizes the author's ability to write. Rest of the options discuss the novel.

10. D f-e is a mandatory pair. This eliminates option B. b-d is another mandatory pair. 'd' takes forward the argument presented in b that states that International society is progressively drawn closer together. This makes D the correct answer.

11. A The argument states that a low physical fidelity system was acceptable. Statement 1 states that the physical stress will affect decision-making abilities, which means that a low physical fidelity system is not a good simulation model . Hence statement 1 weakens the argument. This eliminates options B and E. Statement 2 also weakens the argument as it suggests that despite simulations, humans lack the capacity to adapt to high levels of mental stress.

12. E All the options except E have an idiom in the first part and an example that illustrates the meaning of the idiom in the second half.

13. E From among all the options given, only the word 'felicific' would fit the last blank. Felicific means – "causing or intended to cause happiness". The other two words 'feral' (not domesticated or cultivated) and 'febrile' (nervous, excited and very active- generally caused by fever or illness) do not fit the blank appropriately. This eliminates option A, C and D. 'Feckless' which means 'having a weak character or not behaving in a responsible way' fits the first blank.

14. E The passage suggests the need to change the current incentive system. Statements 4 and 5 support this view.

15. C The argument/theories mentioned in the passage is/ are based on the assumption that there necessarily exists an order. This need for the understanding of this order has led to creation of these theories. Statement 2 supports that existence of this hidden order as it supports the view that there exists very little randomness in the universe. Statement 5 supports the existence of the fear that makes us propound these theories. Statements 2, 3, and 4 tell us why these theories may not be true and hence weaken the idea of the passage. The correct answer choice is option C.

16. D Statement 3 weakens the idea presented by the passage by suggesting that the theories which are being talked about are creations of our (novelists) imagination and do not have any noteworthy basis. Statement 4 presents an idea that is out of the scope of this discussion. Statements 1, 2 and 5 strengthen this idea by giving reasons that substantiate the idea of higher order/sinister forces.

17. A The correct statement should be *"There is much difficulty in getting to this place and it is not possible to reach it without the grace of the lord."*

18. E There should be an apostrophe in the word 'persons' in the first line and a comma after the word development. This eliminates all the options except E.

19. B The given argument states that acknowledging randomness is a precondition for dealing with it. The argument is silent on weather acknowledging randomness will ensure that it can be dealt with.

20. B All the options except B have a relationship.
Water cleans the dirty things.
We burn wood to prepare food.
Juice ferments to give wine.
Rain is accompanied by hail and thunder.

21. D Toyota is said to have retained the character of a learning organization. In the passage it is described as a community of scientists carrying out several small experiments simultaneously as workers in each assembly line design their own operating procedure with the help of the supervisor. Different work norms might even exist in contiguous assembly lines, which reflect different, customized approaches to problem solving. The coordinating process is said to evolve through numerous points of negotiation throughout the organization and accordingly the higher levels of the hierarchy do not exercise the power of the fiat in setting work rules. There is no 'command-control' system despite the presence of rigid operating procedures. So it is the ability of workers to come up with solutions to problems they face on the shop floor which is the key strength of the Toyota model of production.

22. E The production model in Toyota relies on the ability of workers to come up with solutions to problems they face "closest to the site of action" i.e. on the shop floor. This implies minimal management intervention in the design of work rules. So the best pre-condition for the Toyota type of production to work is management's faith in workers' abilities to solve problems in a rigorous manner.

23. A The passage talks about how workers in a particular assembly line, with inputs from the supervisor, develop and fine-tune operating procedures in the process of coming up with best solutions for problems they face in their daily operations. This implies that they have significant control rights over the design of work rules and the leeway to devise solutions and procedures that effectively address the local micro-context of the work.

24. B The Toyota model of production revolves around workers in assembly lines coming up with effective solutions and work rules, which address the problems faced at the very site of action. So it is less a matter of worker's rights (as mentioned in Option C) than the heavy reliance on workers' problem-solving ability that is strength of the Toyota model of production. So option (B) is the best choice here.

25. C The rest of the options relate to mental states, or behaviour or characteristics. Also, often and seldom are adverbs while the rest are nouns.

26. B The author says that there has been a shift in focus from physical reality and fitness to virtual entertainment and labels this "fitness-faking narcissism." This is the key concern raised time and again in the passage. Extraterrestrial life is used more as a metaphor here. So option (A) is incorrect. Technical advancement does not necessarily lead to extinction of intelligence. So option (D) is incorrect. While the author talks about short-term pleasure seeking behaviour, this is used to talk about the shift away from behaviour that increases evolutionary fitness. So option (C) does not address the key concern of the passage.

27. E Option (E) summarizes the author's hypothesis that self-centred and pleasure-seeking behaviour compromises survival and that "Most bright alien species probably go extinct gradually, allocating more time and resources to their pleasures, and less to their children."

28. D The author is most likely to agree with option (D). Fitness-faking gadgets and consumerism tend to wean away humans from reality. ("People would rather play a high-resolution virtual ape in Peter Jackson's King Kong than be a perfect-resolution real human") So it is likely that they would rather play virtual war games than engage in actual combat.

29. E Statements I, III and V each posit a situation where the presence of fitness-faking technologies does not impact real-life violence, action or socialization. Therefore these three statements contradict the author's opinion in the passage. The correct option is (E).

30. C The correct choice is (C). Options (A) and (C) are similar except for the fact that "explicable" is better fit because of the phrase "hidden reasons" which implies there is something in nature that humans might feel the need to "explicate" instead of merely "understand."

31. E "if" fits into the first blank since this addresses the condition in the sentence (If you have a doubt you should go and verify). "…shade of this banyan tree" is the only possible construction here since the banyan tree casts the shade. Only "to" fits into the third blank.

32. A The argument rests on the premise that media are not just passive channels of information. Media here need not necessarily mean the news media or the internet. Note the conjunction "And" in the last sentence. The premise is that the medium which we use influences us. While it does not talk about the internet, Option (A) strengthens this premise. The noticeable change in Nietzsche's prose after he started using a typewriter provides evidence that the change in medium affected him. Option (D) is incorrect because falling asleep while reading a printed book does not mean that concentration levels have decreased all around. (Consider the situation where readers are more interested in reading electronic books and can concentrate on reading as much as before.)

33. E Option (E) directly weakens the argument by showing that the internet has not in the least compromised the ability of younger judges.

34. D The given statement states that impressions result from immediate experience while ideas result from impressions. So statements II and III follow. Statement IV talks about the origin of the idea of the colour of a television set. Since ideas are always derived from impressions, statement IV is also correct according to the given statement. Statement I cannot, however, be concluded from the given statement. While ideas are always derived from impressions, it does not follow that all impressions will give rise to ideas.

35. C The case in question presents the view of the government that holds responsible the top executives of the PSUs for the failure in the implementation of plans. Statements (i), (iii) and (v) present arguments that tell us why it is the government that is responsible and not these executives.

36. E Since both the management and the economic situation of LMN has undergone a change, it will be pragmatic to look at this deal from a fresh perspective and let bygones be bygones. Hence, statement (iv) is a wise line of thought for the CEO of ABC. He can also consider the present market value and economic situation of LMN and decide to try and bid for this company at a later time at a cheaper price. Hence, statement (v) is also correct. This eliminates all the options except E.

37. E Since both the companies are facing similar problems and are in the same sector, there is no visible advantage monetarily as well as from the perspective of portfolio diversification for the resultant entity. The only advantage could be consolidation of assets. Hence E is the strongest option.

38. A Any natural number from 1 to $(2^n - 1)$ can be represented as the sum of some powers of 2 from $2^0, 2^1, 2^2 \ldots, 2^{(n-1)}$.

So if Timon makes 5 parts of lengths 1", 2", 4", 8" and 16", he should be able to pay the rent to the landlady on a daily basis by using these bars.
The process goes like this.
On the first day he will give the 1" bar to the landlady; on the second day he will give the 2" bar and take back the 1" bar; on the third day he will give the 1" bar; on the fourth day he will give the 4" bar and take back the 2" and 1" bars; and so on. This way he would not be required to make any advance payment.

39. D The management needs to placate workers, expose contractors and take unbiased decisions against troublemakers. This will ensure that these workers will continue to work without causing further trouble. Statements 3 and 4 are possible course of actions.

40. C Since CMMS is an association for permanent labourers, they do not want to give membership to contract labourers. But if they continue to alienate themselves from contract labourers then their representative power will diminish. In these circumstances option C will be the best course of action.

41. D At the root of the problem lies the fact that there is no significant legislature that is effective in the current market situation where contract labourers are being employed in greater numbers. Also, it seems that contract labourers do not have any legislature safeguarding their rights. Option D is the best choice under the circumstances.

42. A The immediate attention is required towards the labourers who are already disgruntled. They are also more vulnerable to influence by criminals of the area. Out of A and E, E is a better choice as it takes into account the entire labour class.

43. B Let the images given below depict the structure of Mrs. Sharma's house.

n_4	c	n_3
d		b
n_1	a	n_2

Ground floor

$n_{4'}$	c'	$n_{3'}$
d'		b'
$n_{1'}$	a'	$n_{2'}$

First floor

Let a + b + c + d = A,
a' + b' + c' + d' = A'
$n_1 + n_2 + n_3 + n_4 = N$,
$n_1' + n_2' + n_3' + n_4' = N'$
$\Rightarrow$ A + N = 2(A' + N')
$\therefore$ the total number of students = 3 (A' + N')
Now, A + A' + 2(N + N') = 44.
Since each room must be occupied,
$A + A' \geq 8$ and $N + N' \geq 8$.

Hence, Mrs. Sharma's house can accommodate at most 36 students when N + N' = 8 and A + A' = 28.
If the number of students = 36, then the number of students on first floor and ground floor are 24 and 12 respectively.
Since N' = 4, A' = 20.
But since 20 students cannot be placed in four rooms, 36 is not possible.

If N + N' = 11 and A + A' = 22, the number of students = 33, and the number of students on first floor and ground floor are 22 and 11 respectively.

Now, max N' = 7, hence minimum A' = 22 – 7 = 15.
Even 15 students cannot be placed in four rooms.
Hence, 33 students is also not possible.

If the number of students is 24 then N + N' = 20 and the number of students on first floor and ground floor are 16 and 8 respectively. So each room on the ground floor has only 1 student.
Hence, N = 4 and N' = 16.
Hence, 24 students is not possible.

Hence, the two possible values for the number of students must be 30 and 27 only. Arrangments are possible for each of them without violating any of the conditions (as will see in the next two explanations). Hence, we can say that 27 students must have turned up for renting the rooms.

44. C N + N' = 17, N' = 12 and N = 5.
A = 9 – 5 = 4.
Hence all rooms on the ground floor, except the north-west corner room, are occupied by exactly one student.
Since N' = 12, all the corner rooms on the first floor are occupied by exactly 3 students each.
A' = 18 – 12 = 6.

The arrangement is shown below.

2	1	1
1		1
1	1	1

Ground floor

3	1	3
1		2
3	2	3

First floor

45. If 30 students had turned up for renting the rooms,
N + N' = 14 and A + A' = 16.
Also, N + A = 10.
As the minimum value of A is 4, the maximum value of N is 6. Also, the minimum value of N is 4.
The possible values of the four variables are given below.

N	N'	A	A'
4	10	6	10
5	9	5	11
6	8	4	12

There are multiple possible arrangements some of which are shown below.
Case (i)

1	3	1
2		1
1	1	1

Ground Floor

1	3	3
3		2
3	2	3

First Floor

Case (ii)

1	1	1
1		3
1	1	1

Ground Floor

3	3	2
3		1
2	3	3

First Floor

Case (iii)

1	1	2
1		1
2	1	1

Ground Floor

2	3	2
3		3
2	3	2

First Floor

Hence, we can see that multiple options are correct.

46. C Since three out of five managers have opted for Room No. 302, two of them will have to settle for some other room. Hence, three managers will get rooms as per their first preferences.

47. C The sum of the preference rankings is minimized in the arrangement given below. The sum will be 7.

M_1	M_2	M_3	M_4	M_5
302	304	303	305	301

48. E The sum of the preference rankings will be 9 in either arrangement shown below.

M_1	M_6	M_3	M_4	M_5
302	304	303	305	301
1	4	1	2	1

M_1	M_6	M_3	M_4	M_5
304	301	303	302	305
3	1	1	1	3

49. B The major restriction in case of free tickets offered by other websites (except Cozy_travel) is that the tickets are non-transferable. Hence the free tickets may go waste if one does not wish to travel in the assigned period. However, in the Cozy_travel offer, the tickets can be gifted to a friend which increases the chance of utilising the free tickets manifold.

50.C With the recommended change, the Cozy_travel offer definitely becomes far superior than the Cool_yatra offer. Though Cozy_travel were offering two free tickets initially, the customers probably didn't find the offer very attractive due to the restriction in booking dates.

51. D Easy_travel offer dates don't match with Jagan's travel plans. Cozy_travel offer doesn't suit him as it requires him to book the free ticket at least 21 days in advance whereas he will get a maximum of 15 days for booking a ticket to Akashpur. Jagan should get the flight ticket from Cool_yatra as it will give him time to make use of the free ticket.

52. C Easy_travel's Ek ke sath ek offer (Option A) is not feasible because of the date restrictions. Options C and D are effectively the same and both are better than Options B and E in terms of saving money. Option C is the best as along with bringing down the cost of journey (by using one free ticket), it will give Janaki one extra free ticket that can be gifted to somebody.

53. D Statement a is not relevant and can be eliminated. The preface should start by statement c which says that adverse economic conditions have resulted in all-time highest profits for wind turbine makers worldwide. This negates the argument of the CEO that company's poor performance is a result of adverse economic conditions. It should be followed by statements b and e which state that though the company's sales volume has increased in the year under consideration, it has happened because of charging lower, unprofitable prices.

54. D Let's assume that there is a person X who is a member of the club and that he has exactly two friends A_1 and A_2 in the club. Now, A_1 and A_2 cannot be friends. There has to be one more member in the club who is the second common friend of A_1 and A_2. Let's call this person B_{12}. So the minimum possible number of members in the club is 4. We have to find a similar arrangement where the number of members in the club is more than 4 and less than 22.
Now, let X have m friends A_1, A_2, A_3, ..., A_m.
We can say that no two of A_1, A_2, A_3, A_4, ..., A_m can be friends. There are other members B_{12}, B_{13}, ..., B_{ij} which are ${}^mC_2$ in number. Each member of the club will have exactly m friends.

So the total number of members $n = 1 + m + \frac{m(m-1)}{2}$.

If m = 3, n = 1 + 3 + 3 = 7 and the members will be X, A_1, A_2, A_3, B_{12}, B_{13} and B_{23}. Each of X, A_1, A_2 and A_3 has exactly three friends. However, B_{12}, B_{13} and B_{23} have just two friends each. We cannot assign a third friend to any of the three without violating the conditions.
So m = 3, n = 7 is not possible.

If m = 4, n = 1 + 4 + 6 = 11 and the members will be X, A_1, A_2, A_3, A_4, B_{12}, B_{13}, B_{14}, B_{23}, B_{24} and B_{34}. Each of X, A_1, A_2, A_3 and A_4 has exactly four friends. However, B_{12}, B_{13}, B_{14}, B_{23}, B_{24} and B_{34} have just two friends each and should be assigned two more friends. Let's take the case of B_{12}. He can be assigned B_{34} as a friend but a fourth friend cannot be assigned to him without violating the conditions.
So m = 4, n = 11 is not possible.

If m = 5, n = 1 + 5 + 10 = 16 and the members will be X, A_1, A_2, A_3, A_4, A_5, B_{12}, B_{13}, B_{14}, B_{15}, B_{23}, B_{24}, B_{25}, B_{34}, B_{35} and B_{45}. Each of X, A_1, A_2, A_3, A_4 and A_5 has exactly five friends. Each of B_{13}, B_{14}, B_{15}, B_{23}, B_{24}, B_{25}, B_{34}, B_{35} and B_{45} has two friends by default and needs to be assigned three more. Let's take the case of B_{12}. He can be assigned B_{34}, B_{35} and B_{45} without violating any of the conditions. Likewise three more friends can assigned to each of the rest nine members of the form B_{ij}. E.g. three assigned friends of B_{23} will be B_{14}, B_{15} and B_{45}.
So m = 5 and n = 16 is a valid solution of the problem.

For values of $m \geq 6$, $n \geq 22$, which is not possible.
$\therefore$ There are 16 members in the club.

55. C Each person has exactly 5 friends in the club.

56. E There are 2 engineers, 3 teachers and 1 doctor in the passengers.
From the third statement, we can say that the person from Kolkata and the one who gets down at Mughal Sarai are teachers. Now, passengers from Bengaluru and Chennai are engineers, those from Kolkata and Kochi are teachers, and the doctor is not from Mumbai. So the doctor must be from Hyderabad and the teacher who got down at Mughal Sarai must be from Mumbai. From the fourth statement, we can say that the youngest passenger, who is the doctor, gets down at Kanpur. Now, the teacher from Kochi, who is 35 years old, is as old as the engineer from Chennai.

Now among the persons from Bengaluru, Chennai, Hyderabad and Mumbai, the person from Bengaluru is the oldest. The conclusions can be tabulated as shown below.

Name	Age	Profession	Belongs to	Destination
	>35	Engineer	Bengaluru	Koderma
	35	Engineer	Chennai	New Delhi
	>35	Teacher	Kolkata	
Y	32/33	Teacher	Mumbai	Mughal Sarai
	35	Teacher	Kochi	
Z	31	Doctor	Hyderabad	Kanpur

Option E is true.

57. E The teacher from Mumbai, the traveller from Kochi and the younger engineer.

58. D W must be a teacher. She is from Kochi and is 35 years old.

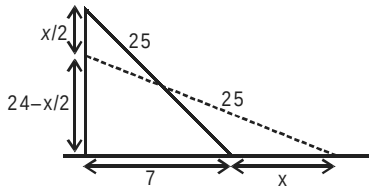
59. A Tax up to Rs. 1,90,000 = 0
Tax for the next Rs. 1,10,000 = 10% of 1,10,000 = Rs. 11,000
Tax for the next Rs. 37,425 = 20% of 37,425 = Rs. 7485
$\therefore$ Income tax = Rs. 18,485
Total surcharge = Rs. 18,485 × 0.03 = Rs. 554.55
$\therefore$ Total Income Tax payable = Rs. 18485 + Rs. 554.55 = Rs. 19039.55

$\therefore$ Required percentage $= \frac{19039.55}{337425} \times 100 \approx 5.64\%$

60. A Let Mr. Madan's total income be Rs. (x + 5) lakhs.
Income tax = 0.1 × 1,40,000 + 0.2 × 2,00,000 + 0.3 × x = Rs. (54,000 + 0.3 x)
Total tax payable including total surcharge = 1.03 × (54000 + 0.3x)
$\Rightarrow$ 3,17,910 = 1.03 (54,000 + 0.3x)
$\Rightarrow$ x = 8,48,834.95
$\therefore$ Madam's income = 8,48,834.95 + 5,00,000 = Rs. 13,48,834.95

61. A Required probability = (1 – 0.418) (1 – 0.612) (1 – 0.355) (1 – 0.520) ≈ 0.069

62. E



$$\left(24 - \frac{x}{2}\right)^2 + (7 + x)^2 = 625$$

$$\Rightarrow \frac{x^2}{4} + x^2 - 24x + 14x = 0$$

$$\Rightarrow \frac{5x^2}{4} = 10x$$

$$\Rightarrow x = 8$$

63. D a_{741}, a_{534} and a_{123} are divisible by 3.
$\therefore$ (i), (ii), and (iii) are correct.
We don't need to check for a_{77} as the only option possible is (D).

64. A Let's first choose the 7 houses from which the thief will not steal. There are 8 spaces around them (including the ends) from which we can pick any 3 houses in which he steals. This way no two houses from where he steals will be adjacent to each other. The three houses can be selected in ${}^8C_3 = 56$ ways.

For questions nos. 65-68:

The data can be tabulated as shown below.

Year	Assets	Sales	CSR (Spending)	CSR / Assets
2004	100×10^7	60×10^5	100×10^3	1×10^{-4}
2005	110×10^7	55×10^5	114.95×10^3	1.045×10^{-4}
2006	125×10^7	80×10^5	200×10^3	1.6×10^{-4}
2007	135×10^7	90×10^5	200×10^3	1.48×10^{-4}
2008	150×10^7	120×10^5	247.2×10^3	1.648×10^{-4}
2009	160×10^7	200×10^5	316×10^3	1.975×10^{-4}

65. B The increase in spending on CSR over the previous year was the maximum in 2006.

66. E Among the options, the ratio of CSR/Assets was the maximum in 2008.

67. D The maximum value of spending on CSR activities was in 2009 at approximately Rs. 3.0 crore.

68. E It can be seen from the table that the spending on CSR never declined compared to previous year.

69. A $x = (9+4\sqrt{5})^{48}$

Let $y = (9-4\sqrt{5})^{48}$

xy

$= \left(9+4\sqrt{5}\right)^{48} \times \left(9-4\sqrt{5}\right)^{48} = (81-80)^{48} = 1$ … (i)

Also, $\left(9+4\sqrt{5}\right)^{48} + \left(9-4\sqrt{5}\right)^{48}$

$\left[{}^{48}C_0\, 9^{48} + {}^{48}C_1 9^{47}\left(4\sqrt{5}\right) + {}^{48}C_2 9^{46}\left(4\sqrt{5}\right)^2 + \ldots\right.$

$\left. + {}^{48}C_{47}(9)\left(4\sqrt{5}\right)^{47} + {}^{48}C_{48}\left(4\sqrt{5}\right)^{48}\right]$

$+\left[{}^{48}C_0\, 9^{48} - {}^{48}C_1 9^{47}\left(4\sqrt{5}\right) + {}^{48}C_2 9^{46}\left(4\sqrt{5}\right)^2 \ldots\right.$

$\left. - {}^{48}C_{47}(9)\left(4\sqrt{5}\right)^{47} + {}^{48}C_{48}\left(4\sqrt{5}\right)^{48}\right]$

$= 2\left[{}^{48}C_0\, 9^{48} + {}^{48}C_2\, 9^{46}\left(4\sqrt{5}\right)^2 + \ldots {}^{48}C_{48}\left(4\sqrt{5}\right)^{48}\right]$

$\Rightarrow$ (x + y) is an integer.

$\Rightarrow [x] + f + y$ is an integer.

As [x] is an integer, (f + y) is also an integer.

Since $0 < 9-4\sqrt{5} < 1$, $0 < \left(9-4\sqrt{5}\right)^{48} < 1$.

$\Rightarrow 0 < y < 1$ … (ii)

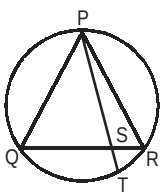
So we can say that (f + y) = 1.

Now, x(1 – f) = xy

From (i), xy = 1

$\therefore x(1-f) = 1$

70. D



As S is not the circumcentre,

$PS \neq ST$ and $QS \neq SR$

PS × ST = QS × SR … (i)

We know that Arithmetic mean $\geq$ Geometric mean

$\Rightarrow \frac{PS+ST}{2} \geq \sqrt{PS \times ST}$

Since $PS \neq ST$,

$\frac{PS+ST}{2} > \sqrt{PS \times ST}$

$\Rightarrow \frac{PS+ST}{2} > \sqrt{QS \times SR}$

$\Rightarrow \frac{PS+ST}{PS \times ST} > \frac{2\sqrt{QS \times SR}}{QS \times SR}$

$\Rightarrow \frac{1}{PS} + \frac{1}{ST} > \frac{2}{\sqrt{QS \times SR}}$ … (ii)

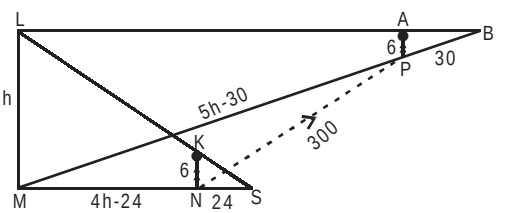
Again, $\frac{QS+SR}{2} > \sqrt{QS \times SR}$

$\Rightarrow \frac{2}{QR} < \frac{1}{\sqrt{QS \times SR}}$

$\Rightarrow \frac{4}{QR} < \frac{2}{\sqrt{QS \times SR}}$

$\Rightarrow \frac{1}{PS} + \frac{1}{ST} > \frac{2}{\sqrt{QS \times SR}} > \frac{4}{QR}$ … From (ii)

71. E



LM is the light house of height h above sea level.
KN is the man, NS is his shadow and MN is south direction.

$\angle KNS = \angle LMS = 90°$

Since Δ LMS and Δ KNS are similar,

$\frac{LM}{MS} = \frac{6}{24} = \frac{1}{4}$

$\therefore$ MS = 4h and MN = 4h – 24.

Since the boat moves 300 m from N to P towards east, NP = 300.

The man's new position is AP.

$\therefore$ AP = 6, PB = 30.

Since $\Delta APB \sim \Delta LMB$,

$$\frac{LM}{MB} = \frac{6}{30} = \frac{1}{5}$$

$\therefore MP = 5h - 30$

Now, $MN^2 + 300^2 = MP^2$

$\Rightarrow 16(h-6)^2 + 300^2 = 25(h-6)^2$

$\Rightarrow h = 106\,m$

72. C The horizontal distance of the man from the light house in the second position

$= 5h - 30 = 500m$

73. D In order to catch the bus, the mechanic has to leave the factory in 12 minutes. As inspecting one machine takes 6 minutes, he will have identified the two faulty machines in 12 minutes if the first two machines he inspects are either both faulty or both working properly.

Required probability $= \frac{1}{2}\times\frac{1}{3} + \frac{1}{2}\times\frac{1}{3} = \frac{1}{3}$

74. C Let x, y and z be three digits between 0 and 4 (both inclusive).
The first of the two consecutive numbers will belong to one of the four types as given below.

(i) 1xyz: $5\times5\times5 = 125$ pairs

(ii) 1xy9: $5\times5 = 25$ pairs

(iii) 1x99: 5 pairs

(iv) 1999: 1 pair

So the total number of pairs = 125 + 25 + 5 + 1 = 156

For questions nos. 75-78:

The given data can be tabulated as shown below.

Level	1	2	3	4	5
Requirements	55	65	225	255	300
Total Employees	52	65	210	130	330
Ex-Defence	6	8	30	25	60
Ex-Policemen	4	4	9	7	15
% Ex-Defence	11.54	12.31	14.2	19.23	18.18
% Ex-Policemen	7.69	6.15	4.28	5.38	4.54

75. D The percentage of Ex-Defence Servicemen is highest in Level 4.

76. D Level 4 will incur much higher reduction than the rest four levels.

77. C The representation of Ex-Policemen is lowest in Level 3.

78. B $f(x) = \log_7\left\{\log_3(\log_5(20x - x^2 - 91))\right\}$

As log is defined only for positive numbers,

$\log_3(\log_5(20x - x^2 - 91)) > 0$

$\Rightarrow \log_5(20x - x^2 - 91) > 3^0 = 1$

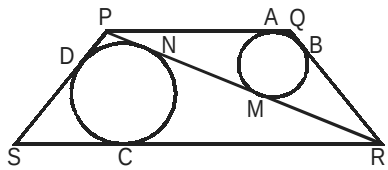
$\Rightarrow 20x - x^2 - 91 > 5$

$\Rightarrow x^2 - 20x + 96 < 0$

$\Rightarrow (x-12)(x-8) < 0$

$\Rightarrow 8 < x < 12$

79. A



Let O_1 touch PQ, QR at points A, B; and O_2 touch PS, RS at points D, C respectively.

Using Statement I:
Quadrilateral PQRS is a tangential quadrilateral.

$\Rightarrow$ PQ + SR = PS + QR

$\Rightarrow$ PA + AQ + SC + CR = SD + DP + QB + BR

Since SC = SD and QA = QB,

PA + CR = DP + BR

Now, PA = PM, CR = RN, DP = PN, BR = RM

$\Rightarrow$ PM + RN = PN + RM

$\Rightarrow$ PN + MN + RM + MN = PN + RM

$\Rightarrow$ MN = O

Hence, Statement I is sufficient to answer the question.

Using Statement II:
Statement II does not give any useful information about quadrilateral PQRS. Hence, Statement II alone is insufficient to answer.

80. E PQ × RQ = XXX

$\Rightarrow$ X is the unit's digit of Q^2.

$\Rightarrow$ X is 1, 4, 5, 6 or 9.

Let X = 111 = 3 × 37...not of the form PQ × RQ

Let X = 444 = 12 × 37 ...not of the form PQ × RQ

Let X = 555 = 15 × 37 ...not of the form PQ × RQ

Let X = 666 = 18 × 37 ...not of the form PQ × RQ

Let X = 999 = 27 × 37, which is of the form PQ × RQ.

$\Rightarrow$ P + Q + R + X = 2 + 7 + 3 + 9 = 21

$\therefore$ Neither Statement I nor Statement II is necessary to answer the question.

81. Let's assume that Mr. Sanyal invests Rs.100 on 1st January and his investments in Gold, US bonds and EU bonds are x, y and z respectively.
$x + y + z = 100$ … (i)
The value of his investment in gold on 31st August = 20720x/20000 = 1.036x
The value of his investment in US bonds on 31st August

$$= y \times \frac{45}{40} \times \left(1 + 0.1 \times \frac{8}{12}\right) = 1.2y$$

The value of his investment in EU bonds on 31st August

$$= z \times \frac{63}{60} \times \left(1 + 0.2 \times \frac{8}{12}\right) = 1.19z$$

$\Rightarrow 1.036x + 1.2y + 1.19z = 113$ ... (ii)
Calculating in a similar way for September,
$1.0425x + 1.2631y + 1.2267z = 116.25$ ... (iii)
Solving (i), (ii) and (iii),
$x \approx 40.97, y \approx 30.96$ and $z \approx 28.07$
Hence, none of the options is correct.

82. B By selecting the highest yielding asset every month, Mr Sanyal will gain approximately 46% at the end of the year.

83. More than one options are incorrect.

84. The question has not been framed properly.

85. D Let there be 10 + 'n' teams.
The bottom 10 teams will play $^{10}C_2 = 45$ matches among each other and 10n matches against the top 'n' teams.
The top 'n' teams will play $^{n}C_2$ matches among each other and 10n matches against the bottom 10 teams.
Since each of the bottom 10 teams earned half of their total points against the other 9 teams in bottom 10, the bottom 10 teams together must have earned 45 points against the top n teams.
Hence, the top n teams together must have earned 10n – 45 points against the bottom 10 teams.
Since half of the points earned by each team were earned in games against the bottom 10 teams, top n teams together must have earned half of their points against the bottom 10 teams.
Hence, $^{n}C_2 = 10n - 45$

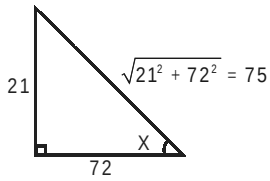
$$\Rightarrow \frac{n(n+1)}{2} = 10n - 45$$

$\Rightarrow (n - 6)(n - 15) = 0$
$\Rightarrow n = 6$ or $n = 15$
If n = 6, then the average points scored by top 6 teams will become less than the average points scored by bottom 10 teams, which cannot be true.
Hence, n = 15.
So the total number of teams = 10 + n = 10 + 15 = 25

86. D Let $f(X) = 21 \sin X + 72 \cos X$
$\Rightarrow f'(X) = 21 \cos X - 72 \sin X$
If $f'(X) = 0$, $21 \cos X = 72 \sin X$.

$$\therefore \tan X = \frac{21}{72}$$

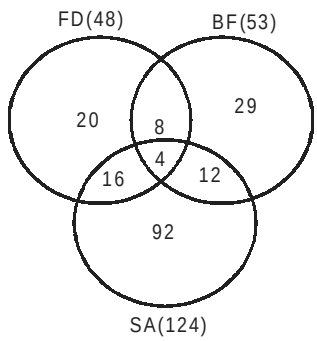
The corresponding right triangle is shown below:



Since $f''(x) = -21 \sin X - 72 \cos X < 0$, f(X) has a maximum at f'(X) = 0.

$$\therefore \text{ Maximum value of } f(X) = 21 \times \frac{21}{75} + 72 \times \frac{72}{75} = 75$$

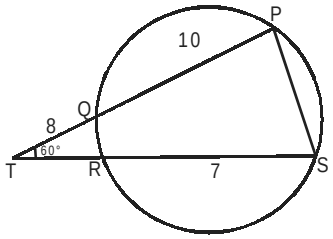
87. A There are 240 – 59 = 181 students who study at least one of Financial Derivatives (FD), Behavioral Finance (BF) and Security Analysis (SA). The Venn diagram is given below:



So the answer = 29.

88. E Since there are 20 cities connected to each other by direct roads, there are $\frac{20 \times 19}{2}$ = 190 roads.
Let the number of candidates be 'n'. These n candidates will use 20n roads.
Hence, $20n \leq 190$.
So the maximum possible value of n = 9.

89. C



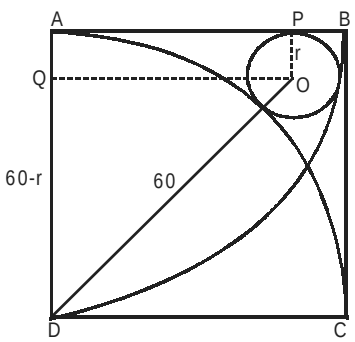
$8 \times 18 = TR(TR + 7)$, which gives TR = 9.

$\text{Area}(\Delta PTS) = \frac{1}{2} \times 18 \times 16 \times \sin 60°$

$= 72\sqrt{3}$ sq.units

90. C The sum of the first three numbers has to be divisible by 3 for their average to be an integer. This is possible only when the first three numbers are 76, 82 and 91 in any order.
76 + 82 + 91 = 249, which is divisible by 3.
So the fourth and fifth numbers are 71 and 80.

91. B



AO = 60 – r
$QO^2 = AP^2 = (60 - r)^2 - r^2$ ... (i)
In ΔDQO,
$QO^2 = DO^2 - DQ^2$
DO = 60 + r and DQ = 60 – r
$\Rightarrow QO^2 = (60 + r)^2 - (60 - r)^2$ ... (ii)
$\Rightarrow (60 - r)^2 + 3600 - 120r = (60 + r)^2$
$\Rightarrow$ r = 10 cm

92. C $x_1x_2x_3x_4x_5x_6x_7$ can be of the form abcdabc or abcabcd. abc can be chosen in $10^3 = 1000$ ways and d can be chosen in 10 ways.
$x_1x_2x_3x_4x_5x_6x_7$ can be formed in 2 x 1000 x 10 = 20000 ways.
But the ways where a = b = c = d = 0, 1, 2, 3, ..., 9 have been counted twice. Also, a = b = c = d = 0 will give us 20000000 which is not valid.
So the answer = 20000 – 2 – 9 = 19989

93. E We can say that the mode of these 7 numbers will always be 4.
If $x \leq 4$, then the median of these seven numbers will also be 4, which is not possible.
If $4 < x \leq 8$, then the median will be x and the mean will be $\frac{50 + x}{7}$.
So 4, x and $\frac{50 + x}{7}$ must form an A.P.

$\Rightarrow \frac{50 + x}{7} - x = x - 4$

$\Rightarrow \frac{50 + x}{7} + 4 = 2x$

$\Rightarrow x = 6$ is one possibility.

If $x > 8$, then the median will be 8 and the mean will be $\frac{50 + x}{7}$.

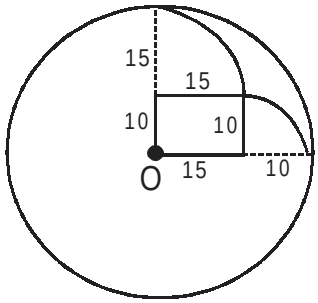
So 4, 8 and $\frac{50 + x}{7}$ must form an A.P.

$\Rightarrow 8 - 4 = \frac{50 + x}{7} - 8$

$\Rightarrow 12 = \frac{50 + x}{7}$

$\Rightarrow x = 34$ is another possibility.
Hence, sum of all possible values of x = 6 + 34 = 40.

94. B



Area available for grazing after building the shed

$$= \frac{3}{4} \times \pi \times 25^2 + \frac{1}{4} \times \pi \times 10^2 + \frac{1}{4} \times \pi \times 15^2$$

$$= 550\pi$$

Area before the shed was built $= 625\pi$

The modified rent should be $\frac{1000}{625} \times 550 = \text{Rs.}880$

95. A Skipping the digit 5 will result in two things:
1. It converts the base system from 10 to 9.
2. The actual value of each digit greater than 5 will reduce by 1 e.g. 6 will be reduced to 5 and 7 to 6 etc.
Hence, the actual value of 3016 will be 3015 in base 9.
$(3015)_9 = 3 \times 9^3 + 0 \times 9^2 + 1 \times 9 + 5 = 2201$

96. B 97. C 98. D 99. C 100. B

101. B (PL + PN) will be minimum if P lies on LN and (PM + PO) will be minimum if P lies on OM.

$\Rightarrow$ PL + PM + PN + PO will be minimum if P is the point of intersection of the diagonals of quadrilateral LMNO.

$LN = \sqrt{(-5-0)^2 + (0-5)^2} = 5\sqrt{2}$

$MO = \sqrt{(1-(-1))^2 + (-1-5)^2} = 2\sqrt{10}$

$\Rightarrow PL + PM + PN + PO = LN + MO = 5\sqrt{2} + 2\sqrt{10}$