

**ONLINE PRACTICE MOCK TEST PAPER II**  
**STATE BANK OF INDIA (GROUP)**  
**ASSISTANT MANAGER (SYSTEMS)**

SPECIALIST CADRE OFFICER  
RECRUITMENT EXAMINATION

No. of Questions : 200

Time Allowed : 2:30 hours

REASONING ABILITY

1. "Mustard" is related to 'Seed' in the same way as 'Carrot' is related to  
(a) Fruit (b) Stem  
(c) Flower (d) Root
2. How many meaningful English words can be formed made with the letters ESTR using each letter only once in each word?  
(a) None (b) One  
(c) Two (d) Three
3. Four of the following five are alike in certain way and so form a group. Which is the one that does not belong to that group?  
(a) Cup (b) Jug  
(c) Tumbler (d) Plate
4. Four of the following five are alike in a certain way and so form a group. Which is the one that does not belong to that group?  
(a) Copper (b) Mercury  
(c) Iron (d) Aluminium
5. 'FI' is related to 'LO' in the same way as 'PS' is related to  
(a) VY (b) VZ  
(c) WZ (d) UX
6. Four of the following five are alike in certain way and so form a group. Which is the one that does not belong to that group?  
(a) 217 (b) 143  
(c) 241 (d) 157
7. K is brother of T. M is mother of K. W is brother of M. How is related to T?  
(a) Maternal uncle (b) Paternal uncle  
(c) Grandfather. (d) Data inadequate
8. 'Gram' is related to 'Mass' in the same way as 'Centimeter' is related to  
(a) Area (b) Volume  
(c) Length (d) Sound
9. Four of the following five are alike in a certain way and so form a group. Which is the one that does not belong to that group?  
(a) 12 (b) 28  
(c) 52 (d) 96
10. If 'white' means 'black', 'black' means 'red', 'red' means 'blue', blue' means 'yellow' and 'yellow' means 'grey', then which of the following represents the colour of clear sky?  
(a) blue (b) red  
(c) yellow (d) cannot be determined
11. How many such pairs of letters are there in the word STAPLER each of which has as many letters between them in the word as in the English alphabet?  
(a) None (b) One  
(c) Two (d) Three
12. In a certain code MODEL is written as '513#2' and DEAR is written as '3#%8'. How is LOAD written in that code?  
(a) 21%3 (b) 23%1  
(c) 25%3 (d) 21#3
13. Town D is to the West of town M. Town R is to the South of town D. Town K is to the East of town R. Town K is towards which direction of town D?  
(a) South (b) East  
(c) North-East (d) South-East
14. How many such digits are there in the number 5261983 each of which is as far away from the beginning of the number as when the digits are arranged in ascending order within the number?  
(a) None (b) One  
(c) Two (d) Three
15. What should come next in the following letter series?  
H G F E D C B A H G F E D C B H G F E D C H  
(a) F (b) G  
(c) B (d) A

Directions (Q. 16-20) : In each of the question below are given three statements followed by two conclusions numbered I and II. You have to take the given statements to be true even if they seem to be at variance with commonly known facts. Read all the conclusions and then decide which of the given conclusions logically from the given statements disregarding commonly known facts.

Give answer as

- (a) if only Conclusion I follows.
- (b) if only Conclusion II follows.
- (c) if either Conclusion I or II follows.
- (d) if neither Conclusion I nor II follows.

16. Statements :  
All benches are cots.  
No cot is lamp.  
Some lamps are candles.  
Conclusions :  
I. Some cots are benches.  
II. Some candles are cots.
17. Statements :  
Some cats are dogs.  
All dogs are goats.  
All goats are walls.  
Conclusions :  
I. Some walls are dogs.  
II. Some walls are cats.
18. Statements :  
Some buildings are sofas.  
Some sofas are benches.  
Some benches are tables.  
Conclusions :  
I. Some benches are sofas.  
II. No table is sofa.
19. Statements :  
All rats are bats.  
Some bats are desks.  
All desks are chairs.  
Conclusions :  
I. Some desks are rats.  
II. Some chairs are rats.
20. Statements :  
Some roads are ponds.  
All ponds are stores.  
Some stores are bags.  
Conclusions :  
I. Some bages are ponds.  
II. Some stores are roads.

Directions (Q. 21-25): Study the following information carefully and answer the questions given below:

P, Q, R, S, T and M are six students of a school, one each studies in Class I-VI. Each of them has a favourite colour from red, black, blue, yellow, pink and green, not necessarily in the same order.

Q likes black and does not study in Class IV or V. The one who studies in Class IV does not like green. P studies in Class II. M likes blue and does not study in Class IV. The one who likes yellow studies in Class VI. S likes pink and studies in Class I. R does not study in Class VI.

21. In which class does R study?  
(a) V (b) III  
(c) IV (d) Data inadequate

22. Which colour does R like?  
(a) Black (b) Yellow  
(c) Green (d) None of these
23. Which colour does P like?  
(a) Green (b) Yellow  
(c) Red (d) Data inadequate
24. Which of the following combinations is correct?  
(a) P - II - Yellow (b) Q - III - Green  
(c) S - I - Black (d) None of these
25. In which class does M study?  
(a) IV (b) III  
(c) II (d) V

Directions (Q. 26-30) : In the follow questions, the symbols @, ©, \$, % and ★ are used with the following meanings as illustrated below:

'P © Q' means 'P is not greater than Q'.

'P%Q' means 'P is not smaller than Q'.

'P ★ Q' means 'P is neither smaller than nor equal to Q'.

'P @ Q' means 'P is neither greater than nor equal to Q'.

'P \$ Q' means 'P is neither greater than nor smaller than Q'.

Now in each of the following questions, assuming the given statements to be true, find which of the conclusions I and II given below them is/are definitely true.

Give answer as

- (a) if only Conclusion I is true.  
(b) if only Conclusion II is true.  
(c) if either Conclusion I or II is true.  
(d) If neither Conclusion I or II is true.

26. Statements :  
K @ V, V © N, N % F  
Conclusions :  
I. F @ V  
II. K @ N

27. Statements :  
H © W, W \$ M, M @ B  
Conclusions :  
I. B ★ H  
II. M % H

28. Statements :  
D % B, B ★ T, T \$ M  
Conclusions :  
I. T © D  
II. M © D

29. Statements :  
M ★ T, T @ K, K © N  
Conclusions :  
I. N ★ T  
II. N ★ M

30. Statements :  
 R \$ J, J % D, D ★ f  
 Conclusions :  
 I. D \$ R  
 II. D @ R

Directions (Q. 31-35) : Study the following information carefully and answer the questions given below:

Following are the condition for selecting Personnel Manager in an organisation:

The candidate must

- (i) be a graduate with at least 50 per cent marks.
- (ii) have a postgraduate degree/diploma in Personnel Management/HR with at least 60 per cent marks.
- (iii) not be more than 35 years as on 1.6.2009.
- (iv) have post-qualification work experience of at least five years in the Personnel/HR Division of an organisation.
- (v) have secured at least 45 per cent marks in the selection process.

In 'the case of a candidate who satisfies all the conditions EXCEPT—

- (a) at (iii) above, but has post-qualification work experience of at least ten years, the case is to be referred to the Director-Personnel.
- (b) at (iv) above, but has post-qualification work experience as Deputy Personnel Manager of at least three years, the case is to be referred to President-Personnel.

In each question below are given details of one candidate. You have to take one of the following courses of action based on the information provided and the conditions and sub-conditions given above and mark the number of that course of action as your answer. You are not to assume anything other than the information provided in each question. All these cases are given to you as on 1.6.2009.

Mark answer as

- (a) if the case is to be referred to the President-Personnel.
- (b) if the candidate is not to be selected.
- (c) if the information provided is inadequate to take a decision.
- (d) if the case is to be referred to the Director-Personnel.

31. Meena Srivastava was born on 6th March 1978. She has been working as Deputy Personnel Manager in an organization for the past four years after completing her postgraduate diploma in HR with 68 per cent marks. She has secured 50 per cent marks in both graduation, selection process.

32. Ketan Desai was born on 5<sup>th</sup> January 1976. He has been working for the past five years in the personnel deptt of an organi-sation after completing his postgraduate diploma in personnel management with 64 percent marks. He has secured 40 per cent marks in the selection process and 52 per cent marks in graduation.

33. Anant Joshi has been working in the personnel department of an organisation for the past six years. He was born on 7<sup>th</sup> November 1977. He has secured 60 per cent marks in postgraduate degree in personnel management. He has also secured 55 per cent marks in both graduation and selection process.

34. Mohan Bajpai was born on 10<sup>th</sup> April 1975. He has secured 55 per cent marks in graduation and 65 per cent marks in postgraduate diploma in personnel management. He has been working in the HR Deptt, of an organisation for the past six years after completing his postgraduate diploma.

35. Gopal Sharma has been working for the past five years in the HR Deptt. of an organisation after completing his postgraduate diploma in HR with 62 per cent marks. He has secured 50 per cent marks in both graduation and selection process. He was born on 29<sup>th</sup> May 1974.

Directions (Q. 36-40):

Study the following information carefully and answer the given question:

A word and number arrangement machine when given an input line of words and numbers rearranges them following a particular rule in each step. The following is an illustration of input and rearrangement.

Input : base 35 or gone 62 49 87 ahead

Step I : 87 base 35 or gone 62 49 ahead

Step II : 87 ahead base 35 or gone 62 49

Step III : 87 ahead 62 base 35 or gone 49

Step IV : 87 ahead 62 base 49 35 or gone

Step V : 87 ahead 62 base 49 gone 35 or

and Step V is the last step of the rearrangement.

As per the rules followed in the above steps, find out in each of the following questions the appropriate step for the given input.

36. Input: how was your stay 56 25 36 64

Which of the following will be step VI?

- (a) 64 how 56 was your stay 25 36
- (b) 64 how 56 stay 36 was 25 your
- (c) 64 how 56 stay 36 was your 25
- (d) There will be no such step

37. Input : power fail now 52 24 75 gate 34

Which of the following steps will be the last but one?

- (a) IV
- (b) V
- (c) VI
- (d) VII

38. Step III of an input is : 91 car 85 14 27 few new house

Which of the following is definitely the input?

- (a) 85 14 91 car 27 few new house
- (b) car 91 85 14 27 few new house
- (c) car 85 14 27 few new house 91
- (d) Cannot be determined

39. Step II of an input is : 75 down 16 24 farm eager 62 sky  
How many more steps will be required to complete the rearrangement?  
(a) Four (b) Five  
(c) Six (d) Seven
40. Input: 14 35 when they came 61 48 home  
How many steps will be required to complete the rearrangement?  
(a) Four (b) Five  
(c) Six (d) Seven
41. In a certain code 'ke pa lo ti' means 'lamp is burning bright' and 'lo si ti ba ke' means 'bright light is from lamp'. Which of the following is the code for 'burning' in that language?  
(a) si (b) pa  
(c) ti (d) ke
42. What will come in place of question mark (?) in the alpha order given below?  
C B A A C B A A B C  
B A A B C C B A A B?  
(a) A (b) B  
(c) C (d) D
43. How many meaningful English words can be formed with the letters RAE using each letter only once in each word?  
(a) None (b) One  
(c) Two (d) Three
44. The following groups of alphabets form a certain pattern with regard to their positions in the English alphabetic series. Based upon the pattern, which of the following five alternatives shall replace the question mark ?  
AD, FC, HK, MJ?  
(a) NQ (b) OQ  
(c) OR (d) MP
45. If the letters in the word DOLPHIN are rearranged as they appear in English alphabetical order, which of the following letters will be the fifth from left?  
(a) O (b) D  
(c) I (d) None of these
46. Four the following five are alike in a certain way and so form a group. Which is the one that does not belong to the group?  
(a) Horse (b) Dog  
(c) Camel (d) Fox
47. In a certain code RUST is written as QVRU. How is LINE written in that code?  
(a) KJMF (b) KJLI  
(c) KMJF (d) KJME
48. How many such pairs of letters are there in the word WONDERS, each of which has as many letters between its two letters as there are between them in the English alphabet?  
(a) One (b) Two  
(c) Three (d) Four
- Directions (Q. 49-50) : A, B, C and D live on floors 3 to 6 of the same six storeyed building, A lives on fourth floor. Only one person lives on the floor between A and B. C does not live on a floor above A's floor.
49. Who lives on a floor immediately above B's floor?  
(a) A (b) C  
(c) D (d) B lives on top floor.
50. Who lives on the fifth floor?  
(a) A (b) B  
(c) C (d) D

### ENGLISH LANGUAGE

Directions (Q. 51-65) : Read the following passage carefully and answer the questions given below it. Certain words have been printed in bold to help you locate them while answering some of the questions.

Over the past few decades, many Asian nations transformed from poverty into global competitors. From 2003 to 2007, Asian economies expanded at an average annual rate of 8.1% triple that of advanced economies. Over the same period, inflation in Asia averaged only about 3.5%. But Asia could be facing turbulent economic times. In May, the average inflation rate throughout the region reached nearly 7%, led by spikes in oil and food prices! In India, inflation jumped to an 11.6% annual rate in June, according to the latest government figures, the highest in 13 years.

Policymakers and central bankers are forced to raise interest rates and limit credit to get inflation under control. But these same measures suppress the investment and consumption that generates growth.

The combination of slowing growth and soaring inflation makes economic policymaking tricky. Inflation stirs up the middle classes because it can quickly erase years of hard-won personal gains. Inflation is cruel to the poor, because families have to spend a larger share of their meagre incomes on necessities. In the Philippines, farmers, unable to afford fuel for tractors, use water buffaloes to plow their fields.

But to avoid unrest, leaders cannot blindly adopt rigid anti-inflation measures. Voters won't hesitate to remove from office any politician who doesn't deliver the goods. So they cannot overreact to the inflation threat and scale down economic growth in the process. Developing nations need to grow quickly to create jobs and increase incomes for their large populations. With prices soaring, doing nothing is not an option. Most central banks in Asia have started raising interest rates. The Reserve Bank of India increased its benchmark rate twice last month to a six-year high of 8.5%.

The challenge is especially difficult because currently, inflation is not of domestic origin. Prices are being driven higher by a global surge in oil and food prices, which individual governments can do little to control. Of course, inflation is not just a problem in Asia. World Bank President Robert Zoellick called rising food and oil prices a man-made "catastrophe" that could quickly reverse the gains made in overcoming poverty over the past seven years. For now, though, there is more talk than action on the international front, so Asian governments are on their own.

Even though inflation throughout the region is likely to continue to rise in coming months, no one is expecting an economic calamity. According to the Asian Development Bank, Asian countries have large hard currency reserves and relatively healthy banks, and so are far better prepared to absorb external shocks than they were during the region's last recession ten years ago. Asian policymakers have learned their lessons and are more alert.

51. Which of the following can be said about Asian economies during the period 2003-2007?
- Though inflation was rising at the time politicians did not pay much attention.
  - Many of the poor countries were able to compete internationally.
  - The growth rate of Asian countries was facilitated by growth in advanced countries.
- All (A), (B) & (C)
  - Only (A)
  - Only (B)
  - Both (A) & (B)
52. What makes it difficult for Asian countries to control inflation?
- Restrictions by organisations like the Asian Development Bank
  - Governments are indecisive and adopt counter productive measures.
  - The problem is global in nature and not restricted to their individual countries.
  - Economic growth cannot occur in the absence of inflation.
53. What is the author's advice to politicians regarding the handling of inflation?
- They should focus on preventing agitations among their citizens not implementing anti-inflation measures.
  - They ought to implement anti-inflation measures even at the cost of losing office.
  - They must focus on maintaining high economic growth rate as inflation will taper off on its own.
  - Countries should handle the problem independently and not collectively.
54. Why is high economic growth necessary for developing countries?
- To catch up with the growth rate of the advanced countries
  - To sustain their economies despite the ill-effects of inflation
  - To provide better educational opportunities for citizens.
  - To create employment opportunities for citizens.
55. Why has inflation been referred to as a "catastrophe"?
- Prices of essential commodities are unaffordable for all.
  - Our past efforts to reduce poverty will be nullified.
  - Governments are unstable and do not take stringent decisions.
  - It has divided countries rather than ensuring co-operation among them.
56. Which of the following factors was responsible for inflation in India?
- Reserve Bank of India raising the interest rates very frequently
  - High population growth
  - Sudden rise in prices of oil worldwide
  - Reckless competition with China
- Directions (Q. 57-58) : Choose the word which is most similar in meaning to the word printed in bold as used in the passage.
57. **stirs**
- trembles
  - moves
  - mixes
  - agitates
58. **scale**
- descent
  - climb
  - hindrance
  - cut
- Directions (Q. 59-60) : Choose the word which is most opposite in meaning to the word printed in bold as used in the passage.
59. **turbulent**
- quiet
  - rest
  - soothes
  - stormy
60. **gains**
- decreases
  - fails
  - deprives
  - losses
- Directions (Q. 61-65) : Which of the phrases (1), (2), (3) and (4) given below should replace the phrase given in bold in the following sentence to make the sentence grammatically meaningful and correct?
61. The main objective of the workshop has made children aware of Western classical music
- will make children are aware
  - is to make children aware
  - is making aware children
  - awareness of children

62. Afraid of missing her train and was late for the meeting, Sunita arrived an hour early the station.  
 (a) but later for (b) and been late to  
 (c) after being late (d) and being late for
63. As a famous historian he has travelled around the world giving lectures on rare subjects.  
 (a) rarely to subjects  
 (b) of rare subject  
 (c) with rarest of subject  
 (d) No correction required
64. The stadium wherever the opening ceremony will be held next month, is equipped with the latest facilities.  
 (a) in the opening ceremony  
 (b) which the ceremony will open  
 (c) where the opening ceremony  
 (d) that the opening ceremony
65. There will be a trend of unseasonal rainfall in April, in recent years.  
 (a) There has been (b) It has been  
 (c) There is being (d) It may have been

Directions (Q. 66-70) : In each of the following sentences there are two blank spaces. Below each five pairs of words have been denoted by numbers (a), (b), (c) and (d). Find out which pair of words can be filled up in the blanks in the sentence in the same sequence to make the sentence meaningfully complete.

66. A committee has been \_\_\_\_\_ to \_\_\_\_\_ the transformation of the city into an international finance centre.  
 (a) constituted, convert  
 (b) appointed oversee  
 (c) converged, evaluate  
 (d) inducted, change
67. Keeping in mind the \_\_\_\_\_ to develop the sector the government has \_\_\_\_\_ solicited foreign investment.  
 (a) importance, never (b) proposal, forcibly  
 (c) objective, wanted (d) need, actively
68. In his speech he vowed to \_\_\_\_\_ the four billion unbanked individuals across the world into the \_\_\_\_\_ of financial inclusion.  
 (a) represent, sphere (b) target, area  
 (c) bring, realm (d) engage, achievement
69. Although he puts in \_\_\_\_\_ of overtime and takes few holidays, he \_\_\_\_\_ can not support his family.  
 (a) sufficient, however  
 (b) lot, besides  
 (c) much, thus  
 (d) plenty, still
70. They have been \_\_\_\_\_ on incentives to \_\_\_\_\_ these practices are implemented at grassroot level.  
 (a) relying, ensure (b) improving secure  
 (c) advocating, confirm (d) debating, necessitate

Directions (Q. 71-75): Rearrange the following six sentences (A), (B), (C), (D), (E) and (F) in the proper sequence to form a meaningful paragraph; then answer the questions given below them.

- (A) It was a cycling race launched in 1903, by Henri Desgrange, a magazine editor in Paris.  
 (B) The Tour de France in a test of human endurance.  
 (C) His idea worked and the magazine boomed.  
 (D) His aim was to boost the circulation of his magazine.  
 (E) He wanted to achieve this by covering every stage of the three-week-long, 3,500-kilometre-long cycling race.  
 (F) Till today the race remains more popular than he could ever have dreamed.
71. Which of the following should be the FIRST sentence after rearrangement?  
 (a) A (b) B  
 (c) C (d) D
72. Which of the following should be the SECOND sentence after rearrangement?  
 (a) A (b) B  
 (c) C (d) D
73. Which of the following should be the THIRD sentence after rearrangement?  
 (a) A (b) B  
 (c) C (d) D
74. Which of the following should be the FIFTH sentence after rearrangement?  
 (a) A (b) B  
 (c) C (d) D
75. Which of the following should be the SIXTH (LAST) sentence after rearrangement?  
 (a) B (b) C  
 (c) D (d) F

Directions (Q. 76-80) : Read each sentence to find out whether there is any grammatical error or idiomatic error in it. The error, if any, will be in one part of the sentence. The number of that part is the answer.

76. On account of the week(a)/ long strike the factory (b)/ was forced to close and (c)/ next month's shipment will delay. (d)
77. Since the US economy experiences (a)/ a recession many Asian countries (b)/ are likely to have (c)/ reduce growth rates this year. (d)

78. Oil is now so expensive that (a)/ India will have to cut subsidies (b)/ instead face running out (c)/ of funds to import oil. (d)
79. It is unlikely that you will (a)/ find a more qualified and experience (b)/ candidate than Mr Prasad (c)/ for the post of President. (d)
80. On account of the rising (a)/ costs many people are (b)/ finding it difficult (c)/ to feed their families. (d)

Directions (Q. 81-90) : In the following passage there are blanks, each of which has been numbered. These numbers are printed below the passage and against each, five words are suggested, one of which fits the blank appropriately. Find out the appropriate word in each case.

In July 2008, one of the most inspiring leaders of our times, will (81) his ninetieth birthday. Nelson Mandela retired from politics in 1999, but he has remained (82), continuing his work through the Nelson Mandela Foundation. The foundation has launched an Aids awareness compaign, 46664, named (83) Mandela's prison number. He has also set up a scholarship programme whose (84) was to promote leadership among young Africans.

During the 1990s, (85) I worked with Mr. Mandela on his autobiography Long Walk to Freedom, I (86) his leadership firsthand. During his election compaign we were on board a plane discussing his book. Twenty minutes (87) to landing the engine failed. Many began to panic. The only thing that (88) them was looking at Mandela, who was reading his paper as if he was a passenger on a morning train to work. The plane landed safely and when we got into the car taking us to hotel he (89) to me, "I was terrified on the plane!"

As a leader he realised he was a model for others and this gave him the strength to (90) over his own fear.

81. (a) tribute (b) remember  
(c) honour (d) celebrate
82. (a) resigned (b) active  
(c) influenced (d) participant
83. (a) by (b) with  
(c) after (d) as
84. (a) wish (b) pursuit  
(c) result (d) aim
85. (a) when (b) that  
(c) period (d) later
86. (a) felt (b) acquainted  
(c) experienced (d) learned

87. (a) before (b) sooner  
(c) close (d) prior
88. (a) calmed (b) soothing  
(c) composed (d) restraint
89. (a) speaks (b) confided  
(c) confidentially (d) entrusted
90. (a) success (b) overcame  
(c) dominate (d) triumphh.

Directions (Q. 91-100) : In the following passage there are blanks each of which has been numbered. These numbers are printed below the passage and against each five words are suggested one of which fits the blank appropriately. Find out the appropriate word in each case.

An old couple was asking for water on the pavement outside an office. They (91) to be pitifully poor. When asked where they were (92) to, they told that they had come from a (93) village to get their cataract afflicted eyes operated. But they were stranded. The stranger who had (94) them there with a promise of treatment was (95). Humanely, few staff members of the office arranged for their (96) for a night and next day (97) to a reputed hospital, whose eye surgeon had helped (98) poor patients. He examined his new patients and got them admitted. The surgeon (99) picked beggars from the streets and operated them for free. The old couple stayed in the hospital for a week and came out with a new (100). They were now happier and healthier.

91. (a) wanted (b) apparently  
(c) wished (d) appeared
92. (a) headed (b) journey  
(c) sitting (d) footing
93. (a) nearing (b) residential  
(c) close (d) nearby
94. (a) took (b) asked  
(c) bring (d) brought
95. (a) forgotten (b) untractable  
(c) untraceable (d) retraceable
96. (a) refuge (b) asylum  
(c) living (d) shelter
97. (a) took (b) transferred  
(c) bought (d) lead
98. (a) many (b) greater  
(c) quiet (d) much
99. (a) timely (b) repeatedly  
(c) unwillingly (d) constantly
100. (a) happy (b) insight  
(c) site (d) sense

## QUANTITATIVE APTITUDE

Directions (101-110) : What should come in place of the question mark (?) in the following questions ?

101.  $\frac{5.4 \div 3 \times 16 \div 2}{18 \div 5 \times 6 \div 3} = ?$   
 (a) 2 (b) 4  
 (c) 6 (d) 8
102.  $6.66 \times 66.6 \times 66 = ?$   
 (a) 27274.696 (b) 29274.696  
 (c) 31274.696 (d) 33274.696
103.  $1\frac{3}{5} + 1\frac{2}{7} + 1\frac{1}{4} = ?$   
 (a)  $5\frac{9}{35}$  (b)  $6\frac{1}{7}$   
 (c)  $3\frac{2}{9}$  (d)  $4\frac{19}{140}$
104.  $\sqrt{\sqrt{3969} + \sqrt{3364}} = ?$   
 (a) 169 (b) 121  
 (c) 141 (d) none of these
105.  $\{(\sqrt{729} \times 32) \div 45\} \times ? = 10502.4$   
 (a) 383 (b) 476  
 (c) 547 (d) 651
106. ?% of 225 + 22% of 555 = 203.1  
 (a) 23 (b) 44  
 (c) 36 (d) 58
107.  $\{(35)^2 + (38)^2\} \div ? = 5$   
 (a) 503 (b) 543.6  
 (c) 567.8 (d) none of these
108.  $(18.92)^2 - \sqrt{121} = ?$   
 (a) 386.9466 (b) 346.9664  
 (c) 366.9646 (d) 356.6964
109.  $1000^{12} \div 10^{30} = ?$   
 (a)  $1000^2$  (b) 10  
 (c)  $100^2$  (d) 100
110. 64% of 562.8 = 25% of?  
 (a) 678.909 (b) 1134.564  
 (c) 360.192 (d) 1440.768

Directions (111-115) : What should come in place of the question mark (?) in the following number series?

111. 8 36 152 620 2496 10004 ?  
 (a) 8190 (b) 8187  
 (c) 40040 (d) 8163
112. 80 120 180 270 405 607.5 ?  
 (a) 850.50 (b) 911.25  
 (c) 1518.75 (d) 759.375

113. 548 567 624 719 852 1023?  
 (a) 1175 (b) 1194  
 (c) 1213 (d) 1232
114. 16 104 572 2574 9009 225225 ?  
 (a) 33783.75 (b) 56306.25  
 (c) 28153.125 (d) 16891.875
115. 500 251 127.5 66.75 37.375 23.6875 ?  
 (a) 17.84375 (b) 17.83475  
 (c) 17.87435 (d) 17.85374

Directions (Q. 116-120) : Study the table carefully to answer the questions that follow:

Number of People Selecting Six Different Products and the Percentage of Men, Women and Children Selecting Those Products.

Product	Total Number of people	Percentage of		
		Men	Women	Children
A	46280	35	25	40
B	45540	25	35	40
C	32240	25	55	20
D	60430	20	50	30
E	36230	10	20	70
F	53990	40	40	20

116. What is the total number of children selecting product E?  
 (a) 27172 (b) 25361  
 (c) 23413 (d) 21781
117. What is average number of women selecting all the products together?  
 (a) 20859 (b) 18765  
 (c) 19076 (d) 17383
118. What is the respective ratio of total number of women selecting product A to those selecting product D?  
 (a) 1 : 3 (b) 42 : 51  
 (c) 2314 : 6043 (d) 413 : 678
119. Number of children selecting product C forms what percentage of those selecting product B? (Rounded off to two digits after decimal)  
 (a) 35.40 (b) 287.10  
 (c) 59.71 (d) 185.40
120. Total number of men selecting product F forms approximately what per cent of the total number of people selecting all the products together?  
 (a) 19 (b) 14  
 (c) 3 (d) 8



Directions (Q. 121-125) : Study the following table carefully to answer the questions that follow:

Percentage of Marks Obtained by Different Students in Different Subjects

Students	Subjects (Marks)						
	Hindi (100)	English (150)	Maths (75)	Physics (150)	Chemistry (150)	Biology (75)	IT (50)
Amit	67	88	92	88	58	60	98
Ruchi	65	78	68	70	64	72	76
Kanchan	89	66	76	76	72	68	76
Prashant	88	80	72	68	62	64	72
Mrinal	78	64	76	74	68	80	78
Kunal	60	86	88	74	94	76	84
Diksha	74	92	96	66	86	88	96

121. How many marks did Kunal get in all the subjects together?  
 (a) 592 (b) 588  
 (c) 634 (d) 606
122. What are the average marks obtained by all students together in Chemistry?  
 (a) 98 (b) 112  
 (c) 88 (d) none of these
123. How many students have scored the highest marks in more than one subject?  
 (a) Four (b) Three  
 (c) Two (d) One
124. Marks obtained by Ruchi in Biology are what percent of marks obtained by Kunchan in the same subject? (Rounded off to two digits after decimal)  
 (a) 94.44 (b) 105.88  
 (c) 113.13 (d) 86.24
125. Who has scored the highest marks in all the subjects together?  
 (a) Diksha (b) Mrinal  
 (c) Ruchi (d) Prashant

Directions (Q. 126-130) : Each question below is followed by two statements A and B. You are to determine whether the data given in the statement are sufficient for answering the question. You should use the data and your knowledge of Mathematics to choose between the possible answers.

Give answer as

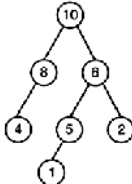
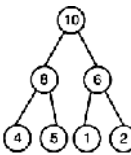
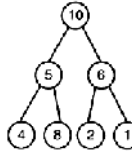
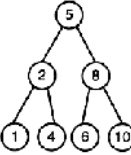
- (a) if the statement A alone is sufficient to answer the question, but the statement B alone is not sufficient.  
 (b) if the statement B alone is sufficient to answer the question, but the statement A alone is not sufficient.  
 (c) if both statements A and B together are needed to answer the question.  
 (d) if either the statement A alone or statement B alone is sufficient to answer the question.
126. What is the salary of R, in a group of P, Q, R, S and T whose average salary is ₹ 45,980?  
 A. Total of the salary of P and T is ₹ 90,670.  
 B. Total of the salary of Q and S is ₹ 76,540.

127. In how many days 16 women can complete a piece of work?  
 A. 10 men can complete the same piece of works in 12 days.  
 B. 21 children can complete the same piece of works in 32 days.
128. What is the three digit number?  
 A. Two – fifth of that number is less by 20 of the half of that number.  
 B. One – fourth of that number is 25% of that number.
129. What is the profit earned by selling a cell phone for ₹ 6,250?  
 A. The cost price of 5 such cell phones is equal to selling price of 4 such cell phones.  
 B. 25% profit is earned by selling each cell phone.
130. The ages of Veer and Deep are in the ratio of 7 : 6. What is the age of Jeet?  
 A. The ages of Veer and Deep are in the ratio of 7 : 4.  
 B. After 5 years, the ratio of Veer's and Jeet's ages will be 8 : 7.
131. What is 25% of 35% of  $\frac{3}{7}$  th of 1680?  
 (a) 21 (b) 3969  
 (c) 189 (d) 63
132. The simple interest accrued on an amount of ₹ 40,000 at the end of four years is ₹ 24,000. What would be the compound interest accrued on the same amount at the same rate in the same period?  
 (a) ₹ 25,960.75 (b) ₹ 30,000  
 (c) ₹ 29,960.25 (d) ₹ 27,000
133. Which number should replace both question marks in the following equation?  

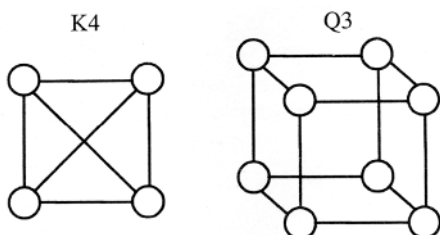
$$\frac{?}{2880} = \frac{180}{?}$$
 (a) 360 (b) 750  
 (c) 540 (d) none of these
134. The sum of four consecutive even numbers is 156. What is the sum of the squares of these numbers?  
 (a) 6104 (b) 9156  
 (c) 7812 (d) 23716
135. The average age of 32 boys in a class is 14 years and the average age of 26 girls in the class is 12 years. What is the average age of all the boys and girls? (rounded off to two digits after decimal)  
 (a) 12.90 years (b) 13.10 years  
 (c) 13.50 years (d) 13.70 years
136. Gautam started a business with a sum of ₹ 60,000. Jatin joined him 8 months later with a sum of ₹ 35,000. At what respective ratio will the two share the profit after two years?  
 (a) 2 : 1 (b) 37 : 14  
 (c) 3 : 1 (d) 18 : 7

137. The cost of 15 kg of sugar is ₹ 255, the cost of 17 kg of tea is ₹ 1,615 and the cost of 22 kg of rice is ₹ 572. What is the total cost of 18 kg of sugar, 21 kg of tea and 27 kg of rice?
- (a) ₹ 3,003 (b) ₹ 3,030  
(c) ₹ 3,300 (d) ₹ 3,330
138. If  $6\frac{3}{4}$  is subtracted from  $9\frac{4}{5}$  and the difference is multiplied by 220, what is the final answer?
- (a) 685 (b) 671  
(c) 666 (d) Cannot be determined
139. If the numerator of a fraction is increased by 400% and the denominator is increased by 300%, the resultant fraction is  $\frac{15}{14}$ . What was the original fraction?
- (a)  $\frac{5}{7}$  (b)  $\frac{3}{2}$   
(c)  $\frac{6}{7}$  (d)  $\frac{5}{4}$
140. By how much is  $\frac{1}{4}$ th of 448 lesser than  $\frac{2}{3}$ rd of 753?
- (a) 320 (b) 340  
(c) 360 (d) None of these
- Directions (Q. 141-150) : What should come in place of the question mark (?) in the following questions?
141.  $38 \times 5.6 \times 11.5 - 31.653 = ?$
- (a) 234.880 (b) 265.404  
(c) 213.067 (d) 256.072
142.  $\frac{4}{5}$  of  $\frac{4}{7}$  of  $\frac{5}{6}$  of 1218 = ?
- (a) 415 (b) 384  
(c) 492 (d) None of these
143. 93% of 456 = ?
- (a) 435.06 (b) 419.02  
(c) 443.04 (d) 424.08
144.  $8.2 \times ? = 465.76$
- (a) 56.8 (b) 48.6  
(c) 62.4 (d) 74.2
145.  $1485 \div (44 \times 0.75) = ?$
- (a) 33 (b) 56  
(c) 45 (d) 67
146.  $128 \div 8 \div 0.4 = ?$
- (a) 36 (b) 42  
(c) 48 (d) None of these
147.  $9358 - 5086 - 2384 = ?$
- (a) 1788 (b) 1988  
(c) 2188 (d) None of these
148.  $8\frac{5}{6} \div 10\frac{11}{36} = ?$
- (a)  $\frac{5}{8}$  (b)  $\frac{5}{7}$   
(c)  $\frac{6}{7}$  (d)  $\frac{6}{11}$
149.  $25^3 \times 4^3 - 800^2 = (?)^2$
- (a) 360000 (b) 60000  
(c) 3600 (d) 6000
150.  $23.35 + 33.25 + 325.52 = ?$
- (a) 382.12 (b) 387.14  
(c) 391.92 (d) 404.86

### COMPUTER AWARENESS

151. An algorithm to find the length of the longest monotonically increasing sequence of numbers in an array  $A[0 : n - 1]$  is given below.
- Let  $L_i$  denote the length of the longest monotonically sequence starting at index  $i$  in the array.
- Initialize  $L_{n-1} = 1$
- for all  $i$  such that  $0 \leq i \leq n - 2$
- $$L_i = \begin{cases} 1 + L_{i+1} & \text{if } A[i] < A[i + 1] \\ 1 & \text{Otherwise} \end{cases}$$
- Finally the length of the longest monotonically increasing sequence is  $\text{Max}(L_0, L_1, \dots, L_{n-1})$ .
- Which of the following statements is TRUE?
- (a) The algorithm uses dynamic programming paradigm  
(b) The algorithm has a linear complexity and uses branch and bound paradigm  
(c) The algorithm has a non-linear polynomial complexity and uses branch and bound paradigm  
(d) The algorithm uses divide and conquer paradigm.
152. A max-heap is heap where the value of each parent is greater than or equal to the value of its children. Which of the following is max-heap?
- (a) 
- (b) 
- (c) 
- (d) 
153. What does the following fragment of C program print?
- ```
Char c [] = "GATE2011";
char *p = c ;
printf (":%s", p + p[3] - p[1]);
```
- (a) GATE2011 (b) E2011  
(c) 2011 (d) 011

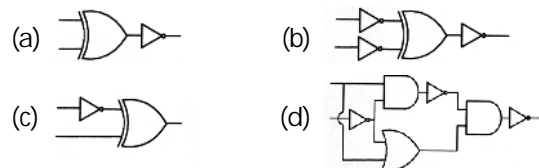
154. Consider a hypothetical processor with an instruction of type LW R1, 20 (R2), which during execution reads a 32-bit word from memory and stores it in a 32-bit register R1. The effective address of the memory location is obtained by the addition of a constant 20 and the contents of register R2. Which of the following best reflects the addressing mode implemented by this instruction for the operand in memory?
- Immediate Addressing
  - Register Addressing
  - Register Indirect Scaled Addressing
  - Base Indexed Addressing
155. Let the page fault service time be 10 ms in a computer with average memory access time being 20 ns. If one page fault is generated for every  $10^6$  memory accesses, what is the effective access time for the memory?
- 21 ns
  - 30 ns
  - 23 ns
  - 35 ns
156. The lexical analysis for a modern computer language such as Java needs the power of which one of the following machine models in a necessary and sufficient sense?
- Finite state automata
  - Deterministic pushdown automata
  - Non-deterministic pushdown automata
  - Turing machine
157. If the difference between the expectation of the square of a random variable ( $E[X]^2$ ) and the square of the expectation of the random variable ( $E[X]$ )<sup>2</sup> is denoted by R, then
- $R = 0$
  - $R < 0$
  - $R \geq 0$
  - $R > 0$
158. K4 and Q3 are graphs with the following structures.



Which one of the following statements is TRUE in relation to these graphs?

- K4 is planar while Q3 is not
- Both K4 and Q3 are planar
- Q3 is planar while K3 is not
- Neither K4 nor Q3 is planar

159. A thread is usually defined as a "light weight process" because an operating system (OS) maintains smaller data structures for a thread than for a process. In relation to this, which of the following is TRUE?
- On per-thread basis, the OS maintains only CPU register state
  - The OS does not maintain a separate stack for each thread
  - On per-thread basis, the OS does maintain virtual memory state
  - On per-thread basis, the OS maintains only scheduling and accounting information
160. The minimum number of D flip-flops needed design and a mod-258 counter is
- 9
  - 8
  - 512
  - 258
161. The simplified SOP (Sum of Product) form of the Boolean expression  $(P + \bar{Q} + \bar{R}).(P + \bar{Q} + R).(P + Q + \bar{R})$  is
- $(\bar{P}.Q + \bar{R})$
  - $(P + \bar{Q}.\bar{R})$
  - $(\bar{P}.Q + R)$
  - $(P.Q + R)$
162. Consider a relational table with a single record for each registered student with the following attributes.
- Registration\_Num: Unique registration number of each registered student
  - UID : Unique identity number, unique at the national level for each citizen
  - BankAccount\_Num: Unique account number at the bank. A student can have multiple accounts or joint accounts. This attribute stores the primary account number.
  - Name : Name of the student
  - Hostel\_Room: Room number of the hostel
- Which of the following options is INCORRECT?
- BankAccount\_Num is a candidate key
  - Registration\_Num can be primary key
  - UID is a candidate key if all students are from the same country
  - If S is a superkey such that  $S \cap UID$  is NULL then  $S \cup UID$  is also a superkey
163. Which one of the following circuits is NOT equivalent to a 2-input XNOR (exclusive NOR) gate?



164. A computer handles several interrupt sources of which of the following are relevant for this question.
- Interrupt from CPU temperature sensor (raises interrupt if CPU temperature is too high)
  - Interrupt from Mouse (raises interrupt if the mouse is moved or a button is pressed)
  - Interrupt from Keyboard (raises interrupt when a key is pressed or released)
  - Interrupt from Hard Disk (raises interrupt when a disk read is completed)

Which one of these will be handled at the HIGHEST priority?

- (a) Interrupt from Hard Disk  
 (b) Interrupt from Mouse  
 (c) Interrupt from Keyboard  
 (d) Interrupt from CPU temperature sensor
165. Which one of the following is NOT desired in a good Software Requirement Specifications (SRS) document?
- (a) Functional Requirements  
 (b) Non-Functional Requirements  
 (c) Goals of Implementation  
 (d) Algorithms for Software Implementation
166. HTML (Hyper Text Markup Language) has language elements which permit certain actions other than describing the structure of the web document. Which one of the following actions is NOT supported by pure HTML (without any server or client side scripting) pages?
- (a) Embed web objects from different sites into the same page  
 (b) Refresh the page automatically after a specified interval  
 (c) Automatically redirect to another page upon download  
 (d) Display the client time as part of the page
167. Which of the following pairs have DIFFERENT expressive power?
- (a) Deterministic finite automata (DFA) and Non-deterministic finite automata (NFA)  
 (b) Deterministic push down automata (DPDA) and Non-deterministic push down automata (NPDA)  
 (c) Deterministic single-tape Turing machine and Non-deterministic single-tape Turing machine  
 (d) Single-tape Turing machine and multi-tape Turing machine
168. A company needs to develop digital signal processing software for one of its newest inventions. The software is expected to have 40000 lines of code. The company needs to determine the effort in person-months needed to develop this software using the basic COCOMO model. The multiplicative factor for this model is given as 2.8 for the software development on

embedded systems, while the exponentiation factor is given as 1.20. What is the estimated effort in person-months?

- (a) 234.25 (b) 932.50  
 (c) 287.80 (d) 122.40

169. Let the time taken to switch between user and kernel modes of execution be  $t_1$  while the time taken to switch between two processes be  $t_2$ . Which of the following is TRUE?

- (a)  $t_1 > t_2$   
 (b)  $t_1 = t_2$   
 (c)  $t_1 < t_2$   
 (d) nothing can be said about the relation between  $t_1$  and  $t_2$

170. A company needs to develop a strategy for software product development for which it has a choice of two programming languages L1 and L2. The number of lines of code (LOC) developed using L2 is estimated to be twice the LOC developed with L1. The product will have to be maintained for five years. Various parameters for the company are given in the table below.

| Parameter                        | Language L1 | Language L2 |
|----------------------------------|-------------|-------------|
| Man years needed for development | LOC/10000   | LOC/10000   |
| Development Cost per man year    | ₹ 10,00,000 | ₹ 7,50,000  |
| Maintenance time                 | 5 years     | 5 years     |
| Cost of maintenance per year     | ₹ 10,00,000 | ₹ 50,000    |

Total cost of the project includes cost of development and maintenance. What is the LOC for L1 for which the cost of the project using L1 is equal to the project using L2?

- (a) 4000 (b) 5000  
 (c) 4333 (d) 4667

171. Consider different activities related to email.
- m1 : Send an email from a mail client to a mail server  
 m2 : Download an email from mailbox to a mail client  
 m3 : Checking email in a web browser
- Which is the application level protocol used in each activity?

- (a) m1 : HTTP m2 :SMTP m3 : POP  
 (b) m1 : SMTP m2 :FTP m3 : HTTP  
 (c) m1 : SMTP m2 :POP m3 : HTTP  
 (d) m1 : POP m2 :SMTP m3 : IMAP

172. If two fair coins are flipped and at least one of the outcomes is known to be a head, what is the probability that both outcomes are heads?

- (a)  $\frac{1}{3}$  (b)  $\frac{1}{4}$   
 (c)  $\frac{1}{2}$  (d)  $\frac{2}{3}$

173. A layer-4 firewall (a device that can look at all protocol headers up to the transport layer) CANNOT
- (a) block entire HTTP traffic during 9:00 PM and 5:00 AM
  - (b) block all ICMP traffic
  - (c) stop incoming traffic from a specific IP address but allow outgoing traffic to the same IP address
  - (d) block TCP traffic from a specific user on a multi-user system during 9:00 PM and 5:00 AM
174. In a compiler, keywords of a language are recognized during
- (a) parsing of the program
  - (b) the code generation
  - (c) the lexical analysis of the program
  - (d) dataflow analysis

175. Database table by name Loan\_Records is given below.

| Borrower | Bank_Manager | Loan_Amount |
|----------|--------------|-------------|
| Ramesh   | Sunderajan   | 10000.00    |
| Suresh   | Ramgopal     | 5000.00     |
| Mahesh   | Sunderajan   | 7000.00     |

What is the output of the following SQL query?

```
SELECT count (*)
FROM (
    (SELECT Borrower, Bank_Manager FROM
    Loan_Records) AS S
    NATURAL JOIN
    (SELECT Bank_Manager, Loan_Amount
    FROM Loan_Records) AS T);
```

- (a) 3
- (b) 9
- (c) 5
- (d) 6

176. The following is the comment for a C function.
- ```
/* This function computes the roots of a quadratic equation
a . x ^ 2 + b . x + c = 0. The function stores two
real roots in *root 1 and *root2 and returns the
status of validity of roots. It handles four different
kinds of cases.
```

- (i) When coefficient a is zero irrespective of discriminant
- (ii) When discriminant is positive
- (iii) When discriminant is zero
- (iv) When discriminant is negative.

Only in case (ii) and (iii), the stored roots are valid. Otherwise 0 is stored in the roots. The function returns 0 when the roots are valid and -1 otherwise.

The function also ensures root 1 > = root 2.

```
int get_QuadRoots (Float a, float b, float c,
float *root1, float *root2);
```

\*/

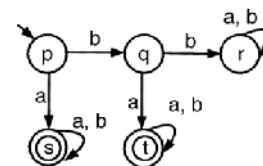
A software test engineer is assigned the job of doing black box testing. He comes up with the following test cases, many of which are redundant.

Test Case	Input set			Expected Output Set		
	a	b	c	root1	root2	Return Value
T1	0.0	0.0	7.0	0.0	0.0	-1
T2	0.0	1.0	3.0	0.0	0.0	-1
T3	1.0	2.0	1.0	-1.0	-1.0	0
T4	4.0	-12.0	9.0	1.5	1.5	0
T5	1.0	-2.0	-3.0	3.0	-1.0	0
T6	1.0	1.0	4.0	0.0	0.0	-1

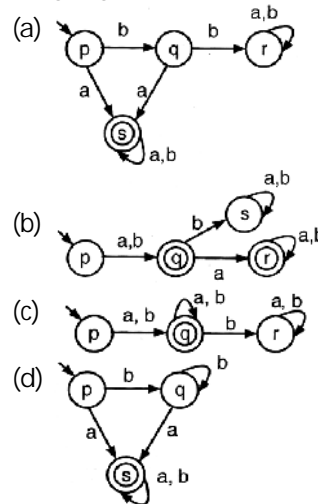
Which one of the following options provide the set of non-redundant tests using equivalence class partitioning approach from input perspective for black box testing?

- (a) T1, T2, T3, T6
- (b) T1, T3, T4, T5
- (c) T2, T4, T5, T6
- (d) T2, T3, T4, T5

177. A deterministic finite automaton (DFA) D with alphabet  $\Sigma = \{a, b\}$  is given below.



Which of the following finite state machines is a valid minimal DFA which accepts the same language as D?



178. An application loads 100 libraries at startup. Loading each library requires exactly one disk access. The seek time of the disk to a random location is given as 10 ms. Rotational speed of disk is 6000 rpm. If all 100 libraries are loaded from random locations on the disk, how long does it take to load all libraries? (The time to transfer data from the disk block once the head has been positioned at the start of the block may be neglected).

- (a) 0.50 s
- (b) 1.50 s
- (c) 1.25 s
- (d) 1.00 s

179. An 8 KB direct mapped write-back cache is organized as multiple blocks, each of size 32-bytes. The processor generates 32-bit addresses. The cache controller maintains the tag information for each cache block comprising of the following.

- 1 Valid bit
- 1 Modified bit

As many bits as the minimum needed to identify the memory block mapped in the cache?

What is the total size of memory needed at the cache controller to store meta-data (tags) for the cache?

- (a) 4864 bits                      (b) 6144 bits
- (c) 6656 bits                     (d) 5376 bits

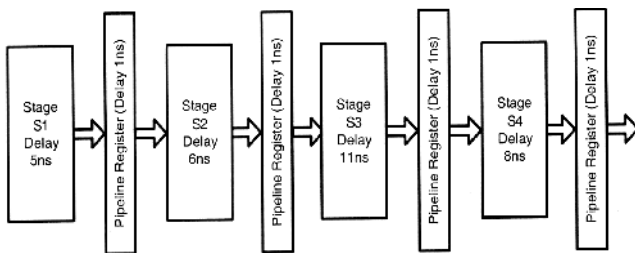
180. Definition of a language L with alphabet {a} is given as following.

$$L = \{a^k \mid k < 0, \text{ and } n \text{ is a positive integer constant}\}$$

What is the minimum number of states needed in a DFA to recognize L?

- (a) k + 1                              (b) n + 1
- (c) 2<sup>n+1</sup>                              (d) 2<sup>k+1</sup>

181. Consider an instruction pipeline with four stages (S1, S2, S3 and S4) each with combinational circuit only. The pipeline registers are required between each stage and at the end of the last stage. Delays for the stages and for the pipeline registers are as given in the figure.



What is the approximate speed up of the pipeline in steady state under ideal conditions when compared to the corresponding non-pipeline implementation?

- (a) 4.0                                  (b) 2.5
- (c) 1.1                                  (d) 3.0

182. Consider the matrix as given below.

$$\begin{bmatrix} 1 & 2 & 3 \\ 0 & 4 & 7 \\ 0 & 0 & 3 \end{bmatrix}$$

Which one of the following options provides the CORRECT values of the eigenvalues of the matrix?

- (a) 1, 4, 3                              (b) 3, 7, 3
- (c) 7, 3, 2                              (d) 1, 2, 3

183. Consider a relational table r with sufficient number of records, having attributes A<sub>1</sub>, A<sub>2</sub>, ... A<sub>n</sub> and let 1 ≤ p ≤ n. Two queries Q<sub>1</sub> and Q<sub>2</sub> are given below.

Q1 :  $\pi_{A_1 \dots A_p} (\sigma_{A_p = c} (r))$  where c is a constant

Q2 :  $\pi_{A_1 \dots A_p} (\sigma_{c_1 \leq A_p \leq c_2} (r))$  where c<sub>1</sub> and c<sub>2</sub> are constants

The database can be configured to do ordered indexing or hashing on A<sub>p</sub>. Which of the following statements is TRUE?

- (a) Ordered indexing will always outperform hashing for both queries
- (b) Hashing will always outperform ordered indexing for both queries
- (c) Hashing will outperform ordered indexing on Q1, but not on Q2
- (d) Hashing will outperform ordered indexing on Q2, but not on Q1

184. Four matrices M<sub>1</sub>, M<sub>2</sub>, M<sub>3</sub> and M<sub>4</sub> of dimensions p × q, q × r, r × s and s × t respectively can be multiplied in several ways with different number of total scalar multiplications. For example when multiplied as ((M<sub>1</sub> × M<sub>2</sub>) × (M<sub>3</sub> × M<sub>4</sub>)), the total number of scalar multiplications is pqr + rst + prt. When multiplied as (((M<sub>1</sub> × M<sub>2</sub>) × M<sub>3</sub>) × M<sub>4</sub>), the total number of scalar multiplications is pqr + prs + pst.

If p = 10, q = 100, r = 20, s = 5, and t = 80, then the minimum number of scalar multiplications needed is

- (a) 248000                              (b) 44000
- (c) 19000                                (d) 25000

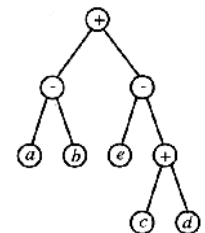
185. Which of the given options provides the increasing order of asymptotic complexity of functions f<sub>1</sub>, f<sub>2</sub>, f<sub>3</sub> and f<sub>4</sub>?

$$f_1(n) = 2^n \qquad f_2(n) = n^{3/2}$$

$$f_3(n) = n \log_2 n \qquad f_4(n) = n^{\log_2 n}$$

- (a) f<sub>3</sub>, f<sub>2</sub>, f<sub>4</sub>, f<sub>1</sub>                      (b) f<sub>3</sub>, f<sub>2</sub>, f<sub>1</sub>, f<sub>4</sub>
- (c) f<sub>2</sub>, f<sub>3</sub>, f<sub>1</sub>, f<sub>4</sub>                      (d) f<sub>2</sub>, f<sub>3</sub>, f<sub>4</sub>, f<sub>1</sub>

186. Consider evaluating the following expression tree on a machine with load-store architecture in which memory can be accessed only through load and store instructions. The variables a, b, c, d and e are initially stored in memory. The binary operators used in this expression tree can be evaluated by the machine only when the operands are in registers. The instructions produce result only in a register. If no intermediate results can be stored in memory, what is the minimum number of registers needed to evaluate this expression?



- (a) 2
- (b) 9
- (c) 5
- (d) 3

187. Consider the following table of arrival time and burst time for three processes P<sub>0</sub>, P<sub>1</sub> and P<sub>2</sub>.

Process	Arrival time	Burst Time
P <sub>0</sub>	0 ms	9 ms
P <sub>1</sub>	1 ms	4 ms
P <sub>2</sub>	2 ms	9 ms

The pre-emptive shortest job first scheduling algorithm is used. Scheduling is carried out only at arrival or completion of processes. What is the average waiting time for the three processes?

- (a) 5.0 ms                      (b) 4.33 ms  
(c) 6.33 ms                      (d) 7.33 ms

188. A deck of 56 cards (each carrying a distinct number from 1 to 5) is shuffled thoroughly. Two cards are then removed one at a time from the deck. What is the probability that the two cards are selected with the number on the first card being one higher than the number on the second card?

- (a)  $\frac{1}{5}$                               (b)  $\frac{4}{25}$   
(c)  $\frac{1}{4}$                               (d)  $\frac{2}{5}$

189. Consider a finite sequence of random values  $X = [x_1, x_2, \dots, x_n]$ . Let  $\mu_x$  be the mean and  $\sigma_x$  be the standard deviation of X. Let another finite sequence Y of equal length be derived from this as  $y_i = a \cdot x_i + b$ , where a and b are positive constants. Let  $\mu_y$  be the mean and  $\sigma_y$  be the standard deviation of this sequence. Which one of the following statements is INCORRECT?

- (a) Index position of mode of X in X is the same as the index position of mode of Y in Y.  
(b) Index position of median of X in X is the same as the index position of median of Y in Y.  
(c)  $\mu_y = a\mu_x + b$   
(d)  $\sigma_y = a\sigma_x + b$

190. Consider a database table T containing two columns X and Y each of type integer. After the creation of the table, one record (X = 1, Y = 1) is inserted in the table.

Let MX and MY denote the respective maximum values of X and Y among all records in the table at any point in time. Using MX and MY, new records are inserted in the table 128 times with X and Y values of MX and MY change.

What will be the output of the following SQL query after the steps mentioned above are carried out?

SELECT Y FROM T WHERE X = 7;

- (a) 127                              (b) 255  
(c) 129                              (d) 257

191. Given  $i = \sqrt{-1}$ , what will be the evaluation of the definite integral  $\int_0^{\pi/2} \frac{\cos x + i \sin x}{\cos x - i \sin x} dx$  ?

- (a) 0                                      (b) 2  
(c) -i                                      (d) i

192. Which one of the following options is CORRECT given three positive integers x, y and z, and a predicate

$P(x) = \neg(x = 1) \wedge \forall y (\exists z(x = y * z) \Rightarrow (y = x) \vee (y = 1))$

- (a) P(x) being true means that x is a prime number  
(b) P(x) being true means that x is a number other than 1  
(c) P(x) is always true irrespective of the value of x  
(d) P(x) being true means that x has exactly two factors other than 1 and x

193. We are given a set of n distinct elements and an unlabeled binary tree with n nodes. In how many ways can we populate the tree with the given set so that it becomes a binary search tree?

- (a) 0                                      (b) 1  
(c) n!                                      (d)  $\frac{1}{n+1} \cdot {}^{2n}C_n$

194. On a non-pipelined sequential processor, a program segment, which is a part of the interrupt service routine, is given to transfer 500 bytes from an I/O device to memory.

Initialize the address register

Initialize the count to 500

LOOP : Load a byte from device

Store in memory at address given by address register

Increment the address register

Decrement the count

If count != 0 go to LOOP

Assume that each statement in this program is equivalent to a machine instruction which takes one clock cycle to execute if it is a non-load/store instruction. The load-store instructions take two clock cycles to execute.

The designer of the system also has an alternate approach of using the DMA controller to implement the same transfer. The DMA controller requires 20 clock cycles for initialization and other overheads. Each DMA transfer cycle takes two clock cycles to transfer one byte of data from the device to the memory.

What is the approximate speedup when the DMA controller based design is used in place of the interrupt driven program based input-output?

- (a) 3.4                                      (b) 4.4  
(c) 5.1                                      (d) 6.7

195. Consider the languages L1, L2 and L3 as given below.

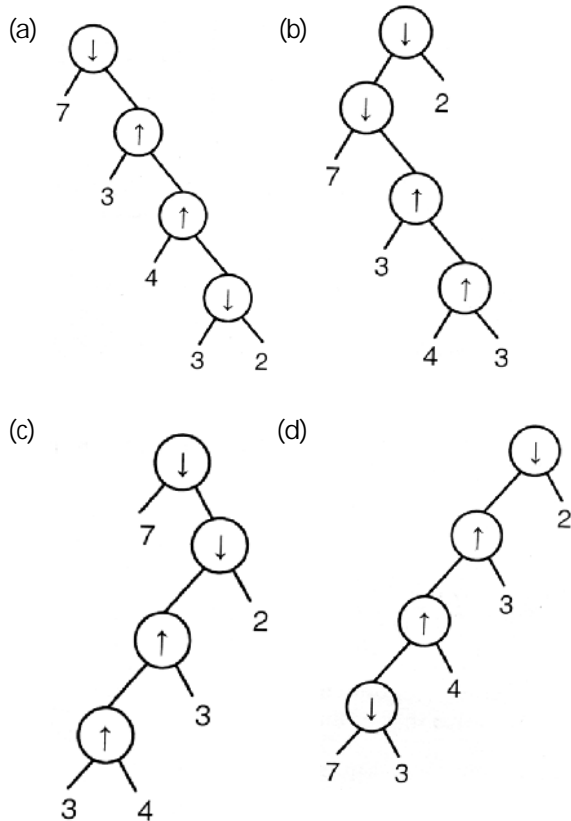
$$L1 = \{0^p 1^q \mid p, q \in \mathbb{N}\}$$

$$L2 = \{0^p 1^q \mid p, q \in \mathbb{N} \text{ and } p = q\}$$

L3 =  $\{0^p 1^q 0^r \mid p, q, r \in \mathbb{N} \text{ and } p = q = r\}$ . Which of the following statements is NOT TRUE?

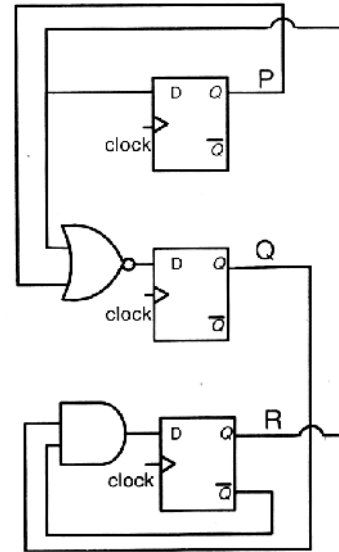
- (a) Push Down Automate (PDA) can be used to recognize L1 and L2
- (b) L1 is a regular language
- (c) All the three languages are context free
- (d) Turing machines can be used to recognize all the languages

196. Consider two binary operators ' $\uparrow$ ' and ' $\downarrow$ ' with the precedence of operator  $\downarrow$  being lower than that of the operator  $\uparrow$ . Operator  $\uparrow$  is right associative while operator  $\downarrow$  is left associative. Which one of the following represents the parse tree for expression  $(7 \downarrow 3 \uparrow 4 \uparrow 3 \downarrow 2)$ ?



Common Data for Questions (197-198) :

Consider the following circuit involving three D-type flip-flops used in a certain type of configuration.



197. If all the flip-flops were reset to 0 at power on, what is the total number of distinct outputs (states) represented by PQR generated by the counter?

- (a) 3
- (b) 4
- (c) 5
- (d) 6

198. If at some instance prior to the occurrence of the clock edge, P, Q and R have a value 0, 1 and 0 respectively, what shall be the value of PQR after the clock edge?

- (a) 000
- (b) 001
- (c) 010
- (d) 011

Directions (Q. 199-200)

Consider the following recursive C function that takes two arguments.

```
unsigned int foo (unsigned int n, unsigned int r) {
    if (n > 0) return ((n % r) + foo (n / r, r));
    else return 0;
}
```

199. What is the return value of the function foo when it is called as foo (513, 2)?

- (a) 9
- (b) 8
- (c) 5
- (d) 2

200. What is return value of the function foo when it is called as foo (345, 10)?

- (a) 345
- (b) 12
- (c) 5
- (d) 3



ANSWERS

1. (d)	2. (b)	3. (d)	4. (b)	5. (a)	6. (b)	7. (a)	8. (c)	9. (d)	10. (b)
11. (c)	12. (a)	13. (d)	14. (c)	15. (b)	16. (a)	17. (d)	18. (c)	19. (d)	20. (b)
21. (c)	22. (d)	23. (a)	24. (d)	25. (d)	26. (b)	27. (d)	28. (d)	29. (a)	30. (c)
31. (d)	32. (b)	33. (c)	34. (c)	35. (b)	36. (d)	37. (c)	38. (d)	39. (a)	40. (c)
41. (b)	42. (c)	43. (d)	44. (c)	45. (d)	46. (d)	47. (a)	48. (d)	49. (d)	50. (d)
51. (c)	52. (d)	53. (a)	54. (d)	55. (b)	56. (c)	57. (d)	58. (d)	59. (a)	60. (d)
61. (b)	62. (d)	63. (d)	64. (c)	65. (b)	66. (b)	67. (d)	68. (c)	69. (d)	70. (a)
71. (b)	72. (a)	73. (d)	74. (c)	75. (d)	76. (d)	77. (a)	78. (c)	79. (b)	80. (d)
81. (d)	82. (b)	83. (c)	84. (d)	85. (a)	86. (c)	87. (d)	88. (a)	89. (b)	90. (d)
91. (d)	92. (a)	93. (d)	94. (d)	95. (c)	96. (d)	97. (c)	98. (b)	99. (b)	100. (b)
101. (a)	102. (b)	103. (d)	104. (d)	105. (c)	106. (c)	107. (d)	108. (b)	109. (a)	110. (d)
111. (c)	112. (b)	113. (d)	114. (a)	115. (a)	116. (b)	117. (d)	118. (c)	119. (a)	120. (d)
121. (d)	122. (d)	123. (c)	124. (b)	125. (a)	126. (c)	127. (d)	128. (a)	129. (d)	130. (b)
131. (d)	132. (c)	133. (d)	134. (a)	135. (b)	136. (d)	137. (a)	138. (b)	139. (c)	140. (d)
141. (c)	142. (d)	143. (d)	144. (a)	145. (c)	146. (d)	147. (d)	148. (c)	149. (a)	150. (a)
151. (a)	152. (b)	153. (c)	154. (d)	155. (b)	156. (a)	157. (c)	158. (b)	159. (a)	160. (a)
161. (b)	162. (a)	163. (d)	164. (d)	165. (d)	166. (d)	167. (b)	168. (a)	169. (c)	170. (b)
171. (c)	172. (a)	173. (a)	174. (c)	175. (c)	176. (c)	177. (a)	178. (b)	179. (d)	180. (b)
181. (b)	182. (a)	183. (c)	184. (c)	185. (a)	186. (d)	187. (a)	188. (a)	189. (d)	190. (a)
191. (d)	192. (a)	193. (d)	194. (a)	195. (c)	196. (b)	197. (b)	198. (d)	199. (d)	200. (b)

