

- Which term of the series 3, 9, 27, ... is 59049?
  - $10^{th}$
  - $12^{th}$
  - $14^{th}$
  - $16^{th}$
- A sequence of numbers whose reciprocals form an arithmetic sequence is called ?
  - arithmetic sequence
  - geometric sequence
  - harmonic sequence
  - fourier sequence
- In a geometric progression the  $5^{th}$  term is 9 times the  $3^{rd}$  term and the sum of the  $6^{th}$  and  $7^{th}$  terms is 1944. What is the first term?
  - 2
  - 3
  - 4
  - 5
- 100 g of a radioactive substance disintegrates at a rate of 3% per annum. How much of the substance is left after 11 years?
  - 20.3g
  - 50.5g
  - 65.3g
  - 71.5g
- The equation whose roots are the reciprocals of the roots of the equation  $x^3 - 15x^2 + 56x - 10$  is
  - $60x^3 + 56x^2 + 15x - 1$
  - $60x^3 - 56x^2 + 15x - 1$
  - $60x^3 - 56x^2 - 15x - 1$
  - $60x^3 - 56x^2 + 15x + 1$
- One of the roots of  $x^3 + 3x^2 - 73x + 165$  is 3. Then the least valued root of the equation is
  - 11
  - 21
  - 31
  - 41
- Let  $A$  be a square matrix with order  $n \times n$  and order  $r$ . If  $r < n$ , how many linearly independent solutions does the equation  $Ax = b$  have?
  - $n$

- B.  $r$
- C.  $n - r$
- D.  $n - 2r$

8. For a square matrix  $A$ , which of the following statements is true?

- 1. The sum of the eigen values of  $A$  is the sum of the diagonal elements of  $A$
  - 2. The product of the eigen values of  $A$  is the product of the diagonal elements of  $A$
  - 3. The sum of the eigen values of  $A$  is the determinant of  $A$
  - 4. The product of the eigen values of  $A$  is the determinant of  $A$
- A. 1 and 2 are true.
  - B. 3 and 4 are true.
  - C. 1 and 4 are true.
  - D. 2 and 3 are true.

9. What is the rank of the matrix  $\begin{bmatrix} 799 & 801 & 803 \\ 804 & 806 & 808 \\ 811 & 813 & 815 \end{bmatrix}$

- A. 1
- B. 0
- C. 2
- D. 3

10. The eigen values of  $\begin{bmatrix} 3 & -5 \\ -5 & 3 \end{bmatrix}$

- A.  $-2, 8$
- B.  $2, 8$
- C.  $2, -8$
- D.  $-2, -8$

11. If for two vectors  $A$  and  $B$ ,  $|A \times B| = |A| \times |B|$ , the angle between the vectors may be which of the following?

- A. 0
- B. 90
- C. 180
- D. 360

12. The perpendicular distance of the point  $(1, 2, 1)$  from the plane  $2x + 2y + z - 5 = 0$  is

- A. 1
- B.  $\frac{1}{2}$
- C.  $\frac{1}{3}$
- D.  $\frac{2}{3}$

13. Let  $\theta$  denote the angle between the planes  $3x + 2y + 4z + 10 = 0$  and  $4x + 3y + 2z - 14 = 0$ . Then  $\cos \theta$  is equal to
- $\frac{1}{2}$
  - $\frac{1}{\sqrt{2}}$
  - $\frac{26}{29}$
  - $\frac{15}{29}$
14.  $(1.002)^9$  evaluates to
- 1.018
  - 1.032
  - 1.064
  - 1.100
15. Solution to  $300e^{-2\theta} + \frac{\theta}{2} = 6$  ?
- 0.74
  - 1.33
  - 2.05
  - No solution
16.  $f(x) = x^2 \sin(x^2) \frac{df(x)}{dx}$
- $2x(\sin(x^2) - x \cos(x^2))$
  - $2x(\sin(x^2) + \cos(x^2))$
  - $2x(\sin(x^2) + x \cos(x^2))$
  - $2x(\sin(x^2) - \cos(x^2))$
17. The Taylor expansion of  $\sin \theta$  is
- $\sum_{i=0}^{\infty} (-1)^i \frac{\theta^{2i+1}}{(2i+1)!}$
  - $\sum_{i=0}^{\infty} \frac{\theta^{2i-1}}{(2i-1)!}$
  - $\sum_{i=0}^{\infty} \frac{\theta^{2i}}{(2i)!}$
  - $\sum_{i=0}^{\infty} (-1)^i \frac{\theta^{2i}}{(2i)!}$
18. If  $u = e^{xy}$ ,  $\frac{\partial^2 u}{\partial x \partial y}$  is
- $e^{xy}(xy + 1)$
  - $e^{xy}xy$
  - $e^{xy}(x^2y + xy)$
  - $e^{xy} + xy$
19.  $\int \cos^3 x dx$  is
- $\frac{\cos x \cos^2 x}{3} + \frac{2}{3} \sin x$

- B.  $\frac{\cos x \cos^2 x}{3} + \frac{2}{3} \cos x$
- C.  $\frac{\sin x \cos^2 x}{3} + \frac{2}{3} \sin x$
- D.  $\frac{\sin x \cos^2 x}{3} + \frac{2}{3} \cos x$

20.  $\int_0^{\pi/2} \sin^5 x dx$  is equal to

- A. 1
- B.  $\frac{2}{3}$
- C.  $\frac{8}{15}$
- D.  $\frac{16}{31}$

21.  $\int_1^2 \int_3^4 (x^2 + y^2) dx dy$  is equal to

- A.  $\frac{22}{9}$
- B.  $\frac{44}{3}$
- C.  $\frac{1}{7}$
- D.  $\frac{37}{5}$

22. The series  $1^p + 2^p + 3^p + \dots$  for all real values of  $p$  with

- A.  $p > 0$
- B.  $p \leq 0$
- C.  $p \geq -1$
- D.  $p < -1$

23.  $(\cos 24\theta + i \sin 24\theta)^5$  is equivalent to

- A.  $(\cos 6\theta + i \sin 6\theta)^{12}$
- B.  $(\cos 12\theta + i \sin 12\theta)^{20}$
- C.  $(\cos 10\theta + i \sin 10\theta)^{24}$
- D.  $(\cos 2\theta + i \sin 2\theta)^{60}$

24. The Laplace transform of  $\sinh 3t$  is

- A.  $\frac{s}{s^2-9}$
- B.  $\frac{s}{s^2+9}$
- C.  $\frac{3}{s^2-9}$
- D.  $\frac{3}{s^2+9}$

25. The inverse Laplace transform of  $\frac{2s+5}{s^2+5s-14}$  is

- A.  $e^{2t} - e^{-7t}$
- B.  $e^{2t} + e^{-7t}$
- C.  $e^{-2t} + e^{7t}$
- D.  $e^{-2t} - e^{7t}$

26. Pressure  $p$  and volume  $v$  are related by  $pv^3 = c$ , where  $c$  is a constant. What is the approximate percentage change in  $c$  when  $p$  is increased by 3% and  $v$  decreased by 1.2%
- 0.6% decrease
  - 0.72% decrease
  - 0.6% increase
  - 0.72% increase
27. The probability of a component failing in one year due to excessive temperature is  $\frac{1}{20}$ , due to excessive vibration is  $\frac{1}{25}$  and due to excessive humidity is  $\frac{1}{50}$ . The probability that a component will not fail due excessive temperature and will not fail due to excess humidity is ?
- 0.002
  - 0.06
  - 0.931
  - 0.998
28. A batch of 40 components contains 5 that are defective. If a component is drawn at random from the batch and tested and then a second component is drawn at random, what is the probability of having one defective component with replacement ?
- $\frac{7}{32}$
  - $\frac{7}{64}$
  - $\frac{70}{390}$
  - $\frac{70}{312}$
29. A package contains 50 similar components and inspection shows that four have been damaged during transit. If six components are drawn at random from the contents of the package, what is the probability that in this sample less than three are damaged ?
- 0.316
  - 0.333
  - 0.931
  - 0.991
30. A production department has 35 similar milling machines. The number of breakdowns on each machine averages 0.06 per week. What is the approximate chance of 1 breakdown per week ?
- 25%
  - 33%
  - 42%
  - 58%
31. Which of the following regular expressions denotes a language comprising all possible strings over the alphabet  $\{a, b\}$  ?
- $a^*b^*$
  - $(ab)^*$

- C.  $(a | b)^*$
- D.  $(a | b)^\dagger$

32. A primitive computer uses a single register. Suppose that the fragment of assembly language code below was written for such a machine:

```

LOAD X
ADD Y
STORE T1
STORE T2
MULT Z
MULT T1
ADD T2
STORE R

```

What expression is evaluated?

- A.  $R = Z^2.(1 + X + Y)^2$
- B.  $R = Z.(X + Y)^2 + (X + Y)$
- C.  $R = Z.(X + Y)^2 + (X + Y)^2$
- D.  $R = Z^2.(X + Y)^2$

33. Consider the following grammar, with start symbol E:

$E \rightarrow E * E | E / E | E + E | E - E | (E) | a | b | c | d | e | f | g | h \dots x | y | z$

The following strings are legal derivations from this grammar:

1.  $a * b + c$
2.  $(a - b) * c$
3.  $a / (b - c)$

Which of the above are rightmost sentential forms?

- A. 1 only
- B. 2 only
- C. 3 only
- D. 1 and 3

34. Consider the production grammar:  $S \rightarrow AB | BC, A \rightarrow wA | x, B \rightarrow y | zB, C \rightarrow w$ . Consider this grammar together with one and only one of the productions (A) through (D). What production from the list may not be added to the grammar if it is to retain its status as an LL(1) grammar?

- A.  $S \rightarrow CA$
- B.  $S \rightarrow z$
- C.  $C \rightarrow z$
- D.  $C \rightarrow BC$

35. Which of the following regular expressions denotes a language comprising all possible string of even length over the alphabet  $\{0, 1\}$ ?

- A.  $(0 | 1)^*$
- B.  $0 | 1(0 | 1)^+$
- C.  $(00 | 01 | 11 | 10)^+$
- D.  $(00 | 01 | 11 | 10)^*$

36. A language  $L$  is defined by  $L = \{x^n y^n \mid n \geq 1\}$ .

Which of the definitions below generates the same language as  $L$  ?

- 1.  $E \rightarrow xEy \mid xy$
- 2.  $(xy) \mid (x^+xyy^+)$
- 3.  $x^+y^+$

- A. I only
- B. I and II
- C. II and III
- D. II only

37. A shift-reduce parser carries out the actions specified within braces immediately after reducing with the corresponding rule of the grammar.

- $S \rightarrow AS \quad \{\text{print "1"}\}$
- $S \rightarrow AB \quad \{\text{print "2"}\}$
- $A \rightarrow a \quad \{\text{print "3"}\}$
- $B \rightarrow bC \quad \{\text{print "4"}\}$
- $B \rightarrow dB \quad \{\text{print "5"}\}$
- $C \rightarrow c \quad \{\text{print "6"}\}$

This syntax-directed translation scheme translates a language whose terminal symbols are a, b, c, and d into another language whose terminal symbols are 1, 2, 3, 4, 5, and 3. What is the translation of  $aaadbcb$ ?

- A. 645211
- B. 645333
- C. 333645211
- D. 645233311

38. Which of the regular expressions (A) through (D) corresponds to this production grammar?

- $S \rightarrow AB \mid AS$
- $A \rightarrow a \mid aA$
- $B \rightarrow b$

- A.  $aa^*b^+$
- B.  $a(ab)^*$
- C.  $(ab)^*$
- D.  $aa^*b$

39. A context-free grammar  $G$  is defined by:  
 $G = (\{a, b\}, \{S, A, B\}, \{S \rightarrow AaaB, A \rightarrow BB \mid b, B \rightarrow AbA \mid a\}, S)$  Which of the following cannot be generated by  $G$ ?
- A. aaaaa
  - B. baab
  - C. baaa
  - D. baabbb

40. Consider the following three grammars:

I	II	III
$A \rightarrow A + A$	$A \rightarrow aAa$	$A \rightarrow aAa$
$A \rightarrow a$	$A \rightarrow bAb$	$A \rightarrow aAb$
	$A \rightarrow b$	$A \rightarrow c$

Which of these grammars is LR (1)?

- A. I only
  - B. II only
  - C. III only
  - D. I and II
41. The minimum number of states needed for an NFA that recognizes  $[01 + (11 + 0)1^*0]^*11$  is
- A. 4
  - B. 5
  - C. 6
  - D. 7
42. The Pumping Lemma is used for proving that an expression is .
- A. regular
  - B. Not regular
  - C. infinite
  - D. Not empty

43. A grammar  $G$  is defined by:  $G = (\{x, y, z\}, \{S, W, X, Y, Z\}, P, S)$  where the members of  $P$  are:  
 $S \rightarrow WZ$   
 $W \rightarrow X \mid Y$   
 $X \rightarrow x \mid xX$   
 $Y \rightarrow y \mid yY$   
 $Z \rightarrow z \mid zZ$

Which of the following regular expressions corresponds to this grammar?

- A.  $xx^* \mid yy^* \mid zz^*$
- B.  $xx^*.(yy^* \mid zz^*)$
- C.  $(xx^* \mid yy^*).zz^*$



D.  $xx^*.yy^*..zz^*$

44. Countable union of regular sets

- A. is a regular set
- B. need not be regular set
- C. is not regular set
- D. is infinite set

45. Consider the complexity of following problems:

1. Is the given grammar ambiguous?.
2. Finding a string which has two parse tree.

Which of the following is correct?

- A. i is easier than ii
- B. both are equal
- C. ii is easier than i
- D. i is solvable

46. Which of the following is correct?

- A.  $0^* \subset (00)^*$
- B.  $(00)^* \subset 0^*$
- C.  $0^* = (00)^*$
- D.  $0^* \cap (00)^* = \phi$

47. If p and q are propositions, then  $p \Rightarrow q$  is equivalent to ..... (Here p' represent the compliment of p)

- A.  $p \wedge q'$
- B.  $p \vee q'$
- C.  $p' \wedge q'$
- D.  $p' \vee q$

48. Let P be a finite set with n elements. Then the number of non trivial subsets of P =

- A.  $2^n$
- B.  $2^n - 1$
- C.  $2^{n-1}$
- D.  $2^n - 2$

49. Let  $P(X)$  denote the set of all subsets of X. Then  $P(\phi) =$  .

- A.  $\{\phi\}$
- B.  $\phi$
- C. not defined

- D.  $\{1\}$
50. The total number of relations on a set with  $n$  elements to itself is
- A.  $2n$
  - B.  $2^n$
  - C.  $n^2$
  - D.  $n/2$
51. How many 1s are present in the binary representation of  $15 * 256 + 5 * 16 + 3$  ?
- A. 11
  - B. 10
  - C. 9
  - D. 8
52. Evaluate the postfix expression:  $6\ 2\ 3\ +\ -\ 3\ 8\ 2\ /\ +\ * \ 2 \wedge 3\ +$
- A. 244
  - B. 1728
  - C. 52
  - D. 131
53. Consider the bit pattern 01010001. Which of the following has a Hamming distance of exactly 2 from this pattern?
- A. 01010000
  - B. 01010011
  - C. 01010010
  - D. 01010110
54. In data structure, sentinel nodes are used to .
- A. reduce the complexity
  - B. avoid special cases
  - C. reduce the memory space
  - D. mprove the readability
55. A five-bit representation is used for integers. If the operation  $-8 - 8$  is performed, in which system(s) will overflow occur?
- A. twos complement
  - B. ones complement
  - C. ones & twos complement
  - D. signed-magnitude & ones complement
56. The portion of the program scheduler in an operating system that dispatches processes is concerned with

- A. assigning ready process to the CPU
  - B. activating suspended I/O-bound process
  - C. temporarily suspending process when the CPU load is too great
  - D. indefinite postponement
57. Associative memory is illustrated by which of the following?
- A. The address of the data is supplied by the user
  - B. The address of the data is generated by the CPU
  - C. There is no need of an address; the information, i.e., the data, is (are) used as an address
  - D. The data are accessed serially
58. The total time to prepare a disk drive mechanism for a block of data to be read from it is
- A. latency
  - B. latency plus seek time
  - C. seek time
  - D. transmission time
59. The only state transition initiated by the user process itself in an operating system is
- A. dispatch
  - B. block
  - C. timer out
  - D. wakeup
60. Page fault in an operating system is reduced when the
- A. processes tend to be CPU-bound
  - B. locality of reference is applicable to the process
  - C. processes tend to be I/O-bound
  - D. Shortest remaining time scheduling is used
61. Which of the following components on the motherboard usually house the IDE connectors ?
- A. PCI Bridge
  - B. ISA Bus
  - C. North Bridge
  - D. South Bridge
62. Which of the following action prevents unauthorized users from connecting their computer to a WLAN ?
- A. enable DHCP on the wireless subnet
  - B. enable MAC address filtering
  - C. enable SSID broadcast on the AP

D. enable DNS on the wireless subnet

**[Directions for Questions 63 - 67] Correctly complete the sentence by choosing a pair of words (seperated by a semi colon) from the suggested answers:**

63. Hastings \_\_\_\_\_ developed as a holiday resort after \_\_\_\_\_.
- A. A seaside town ; World War I
  - B. a seaside town, ; the first world war
  - C. , a seaside town, ; the First World War
  - D. , a Seaside Town, World War I
64. When you attend the test centre be sure to bring your personal \_\_\_\_\_ test appointment \_\_\_\_\_ thinking cap.
- A. ID, your ; card and your
  - B. ID your card ; your
  - C. ID and your ; card your
  - D. id ; your card plus your
65. In most tests taken on a computer be sure of your answer before submitting \_\_\_\_\_ \_\_\_\_\_ go back and review your answer.
- A. It ; you Cannot
  - B. it you ; can
  - C. it you ; can
  - D. it because you ; cannot
66. The head \_\_\_\_\_ was very surprised to see the \_\_\_\_\_ in the kitchen.
- A. chief ; house fly
  - B. chef ; housefly
  - C. chief ; house-fly
  - D. chef ; house fly
67. We will have lunch in \_\_\_\_\_ hour; do you think you will want \_\_\_\_\_ slice of pizza or two?
- A. an ; a
  - B. an ; one
  - C. a ; one
  - D. a ; an

**[Directions for Questions 68 - 72] Identify the correct sentence:**

68. 1. He had nothing except what he was borne with.  
2. He had nothing apart from what he was born with.  
3. He had nothing besides what he was borne with.  
4. He had nothing apart from what he was borne with.

- A. 1
- B. 2
- C. 3
- D. 4

69. 1. I lent my brothers bike so I could go for a nice drive.  
2. I borrow my brothers bike so I could for a really nice drive.  
3. I lend my brothers bike so I could go for the drive of my life.  
4. I borrowed my brothers bike and all I did was sit in a traffic jam.

- A. 1
- B. 2
- C. 3
- D. 4

70. 1. As one gets older one better appreciates these things.  
2. As you gets older one better appreciates these things.  
3. As one gets older you better appreciates these things.  
4. As you gets older you better appreciates these things.

- A. 1
- B. 2
- C. 3
- D. 4

71. 1. Most professional dancers choose this kind of gurus.  
2. Most professional dancers choose these kind of guru.  
3. Most professional dancers choose this kind of guru.  
4. Most professional dancers choose these kind of gurus.

- A. 1
- B. 2
- C. 3
- D. 4

72. 1. He lay between the sheets staring up at the window.  
2. He lie between the sheets staring up at the window.  
3. He lay among the sheets staring up at the window.  
4. He lie among the sheets staring up at the window.

- A. 1
- B. 2
- C. 3

D. 4

73. Sit is to stand as : Wander is to: ?

- A. meander
- B. march
- C. stroll
- D. trek

74. lucid is to intelligible as: static is to: ?

- A. stationery
- B. stationer
- C. stationary
- D. stationar

75. naive is to sophisticated as: sophisticate is to: ?

- A. avant-garde
- B. provincial
- C. cosmopolitan
- D. degrade

76. malicious is to commendatory as: clamorous is to: ?

- A. raucous
- B. muted
- C. vociferous
- D. virus

77. vocation is to career as : plebiscite is to: ?

- A. worker
- B. referendum
- C. decree
- D. passenger

**[Directions for Questions 78 - 82] Identify the correct sequence of the sentences given:**

78. **A.** At 3,560 feet, Snowdon is the highest mountain south of the Scottish Highlands. **B.** Its 845 square miles make only a slightly smaller area than the 866 square miles of the English Lake District. **C.** Snowdonia is the second largest national park in Great Britain. **D.** Over 500,000 people climb it each year.

- A. CBAD
- B. CABD
- C. ACBD

D. ABCD

79. **A.** They may seem like an arcane field of investigation: after all, are there not more pressing problems with extant species? **B.** But the development of a species, its transformations and final extinction are all elements that can be applied to current-day biology. **C.** Their closest living relative is the horseshoe crab. **D.** Trilobites roamed the world's oceans some 500 million years ago.

A. ABCD

B. DCAB

C. ACBD

D. DACB

80. **A.** The huge amount of energy is radiated out from the core and some eventually reaches Earth, keeping us alive. **B.** It has been doing this for 4,500 million years, but is still only halfway through its lifetime. **C.** The sun is using up its mass at the rate of 4 million tonnes each second. **D.** It is a middle-aged star.

A. ACBD

B. CDBA

C. ABCD

D. CBDA

81. **A.** The same applies to spacecraft that operate in places where there is no atmosphere at all. **B.** Jet airliners fly at heights of 10,000 metres or more. **C.** Such aircraft are said to be pressurized. **D.** At such heights the atmosphere is so thin that the aircraft must have its own air supply with oxygen at the normal pressure.

A. ACDB

B. ABCD

C. BDCA

D. BCDA

82. **A.** The sapwood is less dense and therefore softer than the heartwood. **B.** The heartwood is extremely dense and hard and its only job is to support the tree. **C.** It is therefore much wetter than the heartwood. **D.** It provides support too, but it also carries water and mineral salts (sap) up the trunk.

A. BDAC

B. ACBD

C. ADBC

D. BADC

**[Directions for Questions 83 - 87] Reading Comprehension:**

The standard of medicine in Russia is generally agreed to be very high. There is no shortage of well qualified experts, and there is a lot of individual attention. Treatment is backed up by

the latest in the way of medical technology. Doctors and hospitals do their utmost not to make mistakes, because if they do they risk being made to pay out enormous sums in compensation.

But the Russian health care system has what look like insoluble problems. There are in fact two systems side by side. One is the private system run on the basis of free competition. The other is the public system which had to be created because such a large part of the population, including many of the elderly, could not afford to pay for the absurdly expensive private treatment.

The public system is vast. A huge proportion - more than 20 per cent - of the Russian budget goes on it. Yet there are still very large numbers of Russians who are not covered even by this service. The government tries to keep expenditure down and so sets limits to the income of people using the system. Millions of the unemployed are another important group that is excluded.

83. What is the state of the health system in Russia? It is
- A. unsatisfactory
  - B. satisfactory
  - C. too risky
  - D. too mechanised
84. Among those Russians who cannot get proper health care are
- A. some people who earn too much.
  - B. old people.
  - C. people with very large incomes.
  - D. private patients.
85. The Russian health care system has
- A. insoluble problems
  - B. soluble problems
  - C. seemingly insoluble problems.
  - D. perennial problems.
86. In Russian health care system, medical treatment is
- A. modern
  - B. sensibly expensive
  - C. amenable to unemployed
  - D. limited to budget
87. What can patients expect with regard to treatment in Russia ?
- A. Frequent mistakes by doctors.
  - B. Very honest hospitals.
  - C. Personal attention.
  - D. Some of the most skilful nurses in the world.



88. 60% of 20% of  $\frac{3}{5}$  of ? = 450
- A. 6200
  - B. 6240
  - C. 6275
  - D. None of these
89. The ratio of fishes and frogs in a pond is 37 : 39 respectively. The average number of fishes and frogs in the pond is 152. What is the number of fishes in the pond?
- A. 148
  - B. 156
  - C. 158
  - D. 160
90. If the numerator of a fraction is increased by 200% and the denominator of the fraction is increased by 250%, the resultant fraction is  $\frac{3}{14}$ . What is the original fraction?
- A.  $\frac{1}{4}$
  - B.  $\frac{3}{14}$
  - C.  $\frac{1}{6}$
  - D.  $\frac{2}{3}$
91. A thief is spotted by a policeman from a distance of 50m. When the policeman starts the chase, the thief also start running. If the speed of the thief is 2m/s and that of policeman is 4 m/s. What is the distance covered by the thief when he is caught by the policeman?
- A. 50 m
  - B. 100 m
  - C. 150 m
  - D. 200 m
92. Five pendulum clocks in a watch repair shop begin to make ding-dong sound together at intervals of 8 sec, 6, sec, 4 sec, 12 sec and 10 sec respectively. How many times will they make ding-dong sound together in the duration of one hour (excluding the ding-dong at the start) ?
- A. 12
  - B. 20
  - C. 30
  - D. 36
93. How many different 6-letter arrangements can be formed using the letters in the word ABSENT, if each letter is used only once?
- A. 6
  - B. 36
  - C. 42

D. 720

94. The numbers from the set  $\{9, 11, 12, 15, 16\}$  must be put in Boxes named  $\{A, B, C, D, E\}$  with the conditions that (i) Boxes A, C and D contain numbers divisible by three (ii) Box B contains a prime number. Which number must be in Box E?
- A. 9
  - B. 12
  - C. 15
  - D. 16
95. A die is rolled. What is the probability that the number rolled is greater than 2 and even?
- A.  $\frac{1}{2}$
  - B.  $\frac{1}{3}$
  - C.  $\frac{2}{3}$
  - D.  $\frac{5}{6}$
96. In how many ways can we get a sum of 7 or 11 when two distinguishable dice are rolled?
- A. 5
  - B. 6
  - C. 7
  - D. 8
97. A movie theatre sells 3 sizes of popcorn (small, medium, and large) with 3 choices of toppings (no butter, butter, extra butter). How many possible ways can a bag of popcorn be purchased?
- A. 1
  - B. 3
  - C. 9
  - D. 27
98. Suppose that a certain software product has a mean time between failures of 10,000 hours and has a mean time to repair of 20 hours. If the product is used by 100 customers, what is its availability?
- A. 80%
  - B. 98.9%
  - C. 99.8%
  - D. 100%
99. Let  $N$  be the set of all natural numbers. Which of the following sets are countable?
- I. The set of all functions from  $N$  to  $\{0,1\}$
  - II. The set of all functions from  $\{0,1\}$  to  $N$
  - III. The largest subset of  $N$
- A. I and II only

- B. I and III only
- C. II and III only
- D. I, II and III

100. How many different nonempty collections can be formed from five (identical) white balls and eight (identical) red balls?

- A. 53
- B. 54
- C. 63
- D. 64

101. In how many ways can you choose two groups of 3 people from 8 people to serve on two different committees? With the assumption that a person could be in two group.

- A. 24
- B. 56
- C. 112
- D. 3136

102. A box weighs one kilogram plus half of its weight. How much does the box weigh?

- A. 1.333... kilograms
- B. 1.5 kilograms
- C. 1.666... kilograms
- D. 2 kilograms

103. What is Power(A) of  $A = \{a, b, c, d\}$ ?

- A. 4
- B. 8
- C. 12
- D. 16

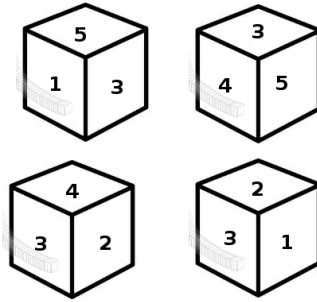
104.  $\binom{n}{0} + \binom{n}{1} + \dots + \binom{n}{n}$  is ?

- A. 0
- B. 1
- C. n
- D.  $2^n$

105. 1, 2, 24, 48, 384, 3840, 46080 ... Which one of the number is **wrong** in the series ?

- A. 3840
- B. 384
- C. 24
- D. 1

106. Identify the next term in the series DMP, FLN, HKL, JJJ, ...
- A. LIH
  - B. MII
  - C. III
  - D. MIF
107. Paisa : Rupee :: ?
- A. Rupee : Wealth
  - B. Kilogram : Quintal
  - C. Coin : Money
  - D. Weight : Ton
108. In a certain code (a) '274' means 'spread the carpet' (b) '246' means 'dust the carpet' and (c) '234' means 'roll the carpet'. Which digit in this code means 'roll' ?
- A. 3
  - B. 4
  - C. 5
  - D. 6
109. Let  $p$  denote "He is rich" and let  $q$  denote "He is happy". "He is poor" is denoted as  $\neg p$  and "He is unhappy" as  $\neg q$ . Then the statement "It is necessary to be poor in order to be happy" is denoted as
- A.  $p \Rightarrow \neg q$
  - B.  $\neg p \wedge \neg q$
  - C.  $q \Rightarrow \neg p$
  - D.  $\neg p \Leftrightarrow \neg q$
110. There are 6 roads between A and B and four roads between B and C. In how many ways one can drive round-trip from A to C by way of B without using the same road more than once?
- A. 24
  - B. 30
  - C. 360
  - D. 576
111. Study the different positions of a cube as given below. Which number will occur on face opposite to 4?
- A. 1
  - B. 3
  - C. 5
  - D. 6



112. After getting two successive discounts, Raju got an item with list price of Rs. 150 for Rs. 105. If the second discount was 12.5%, what is the first discount?
- A. 20%
  - B. 25%
  - C. 30%
  - D. 35%

**[Directions for Questions 113 - 117] Read the following paragraph and answer the questions:**

Fabric X has to go through three stages of manufacturing, viz., spinning, weaving and dyeing. In ABC Fabric Company, there are six spinning machines, ten weaving machines and five dyeing machines. Each machine works for 10 Hrs a day. One unit of Fabric X needs 40 minutes on a spinning machine, 2 Hrs on a weaving machine and 30 minutes on a dyeing machine in order to be completed. Similarly one unit of Fabric Y needs 60 minutes on a spinning machine, 30 minutes on a weaving machine and 60 minutes on a dyeing machine in order to be completed.

113. In a day, how many units of Fabric Y can be completed at most?
- A. 20
  - B. 30
  - C. 40
  - D. 50
114. If 20 units of Fabric Y are made in a day, how many units of Fabric X can be completed the same day?
- A. 0
  - B. 20
  - C. 40
  - D. 45
115. If one more dyeing machine is added, at the most how many more units of Fabric X can be made in a day?
- A. 0

- B. 5
- C. 8
- D. 10

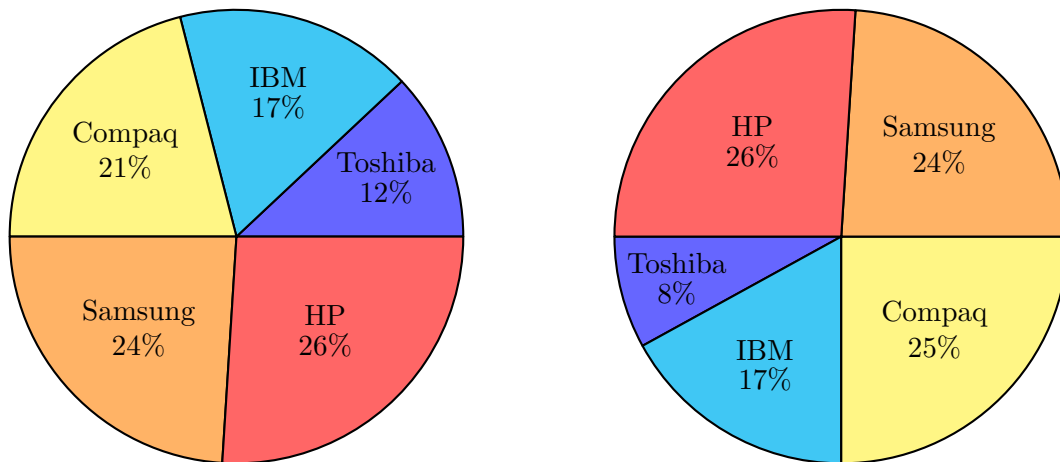
116. If only 30 units of Fabric Y are made in a day, how many machine hours will be idle that day?

- A. 120
- B. 130
- C. 135
- D. 150

117. If only Fabric Y has to be made, what machines should be bought so that there is a maximum increase in production capacity (only one machine has to be bought) ?

- A. spinning machine
- B. weaving machine
- C. dyeing machine
- D. any one of three

**[Directions for Questions 118 - 122] Based on the data given on the pie-chart, solve the questions which follow:**



Sales in the year 1998 (left) and in the year 1999 (right) is shown above.

Total sales in year 1998 = 7890

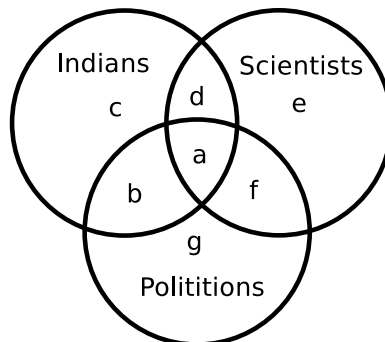
% increase in the year 1999 = 16.5

118. The percentage change in the sales of Thoshiba in 1999 is approximately ?

- A. 16%
- B. 22%
- C. 61%
- D. 68%

119. Which brand of computers among those shown, exhibited the second highest rate of growth in the two years and had less sales in 1999 than 1998 ?
- HP
  - Samsung
  - Compaq
  - All of these
120. What is the ratio between Compaq sales in 1998 and those of IBM in 1999 ?
- 0.94
  - 1.06
  - 1.13
  - 0.89
121. For which brand of computers, did the sale increase the maximum in terms of absolute value between the two years?
- IBM
  - HP
  - Samsung
  - Compaq
122. IBM's sales in 1998 is what percentage of the sales of Samsung in 1999 ?
- 46.34%
  - 52.34%
  - 57%
  - 60.8%

**[Directions for Questions 123 - 126] Based on the data given on the venn diagram, answer the questions which follow:**



123. The region which represents the Indians who are politicians but not scientists:
- a
  - g

- C. f
- D. b

124. The region which represents the scientists who are Indians but not politicians

- A. d
- B. f
- C. a
- D. b

125. The region which represents non-Indian scientists who are politicians:

- A. b
- B. f
- C. d
- D. a

126. The region which represents Indians who are neither scientists nor politicians:

- A. c
- B. g
- C. e
- D. a

**[Answer Questions 127 to 136] based on Python.**

127. What is the output of `print str[2:]` if `str = 'Hello World!'` ?

- A. Hello World!
- B. llo
- C. llo World!
- D. None of the above

128. What is the output of `print tuple[1:3]` if `tuple = ('xyza', 786, 2.23, 'ragi', 70.2)` ?

- A. ('xyza', 786, 2.23, 'ragi', 70.2)
- B. xyza
- C. (789, 2.23)
- D. None of the above

129. Which of the following function returns a random item from a list, tuple, or string ?

- A. `choice(seq)`
- B. `randrange([start,]stop[,step])`
- C. `random()`
- D. `seed([x])`

130. What is the output of `L[-2]` if `L = [1,2,3]`?



- A. 1
- B. 2
- C. -2
- D. Error

131. What will be the output of the following code:

```
import numpy as np
a = np.array([1, 2, 3, 4, 5])
b = a[1:4]
b[0] = 200
print(a[1])
```

- A. 1
- B. 2
- C. 200
- D. Error

132. What is the output of below program?

```
for i in range(10):
    if i == 5:
        break
    else:
        print(i)
else:
    print("Here")
```

- A. 0 1 2 3 4 Here
- B. 0 1 2 3 4 5 Here
- C. 0 1 2 3 4
- D. 1 2 3 4 5

133. What is the output of the code:

```
x = [5, 3, 6, 2, 4, 0,7]
del [0:4]
y = str(x[0]) + str(x[1])
print (y)
```

- A. 4
- B. 7
- C. 11
- D. 40

134. What is the output of the following code ?

```
X = {}
X[(1,2,4)] = 8
X[(4,2,1)] = 10
```

```
X[(1,2)] = 12
tot = 0
for k in X:
    tot += X[k]
print len(X) + tot
```

- A. 12
- B. 24
- C. 30
- D. 33

135. What is the output of the following code ?

```
def fun(i):
    i[0] = 1
j = [0]
fun(j)
print(j)
```

- A. [0]
- B. [1]
- C. [0, 1]
- D. [1, 0]

136. What is the output of the following code ?

```
x = ['xy', 'za']
print(list(map(len, x)))
```

- A. [2]
- B. [2,2]
- C. ['xy', 'za']
- D. xy, za

**[Answer Questions 137 to ??] based on Object Oriented Concepts.**

137. Information hiding is achieved through ?

- A. encapsulation, inheritance
- B. inheritance, class templates
- C. inheritance, polymorphism
- D. encapsulation, abstraction

138. Which one of the following is a weak relationship between two objects ?

- A. aggregation
- B. association
- C. generalization

- D. composition
139. "A car has engine". What type of relation exist between car and engine ?
- A. aggregation
  - B. association
  - C. generalization
  - D. composition
140. If only one behaviour of a derived class is incompatible with base class, then it is:
- A. inheritance
  - B. extension
  - C. generalization
  - D. specialization
141. Objects communicate through ?
- A. messages
  - B. member variables
  - C. both of the above
  - D. none of the above
142. A mechanism used to specify an action performed by some function is ?
- A. boolean expression
  - B. lambda expression
  - C. template arguments
  - D. exception statement
143. What mechanism is used to prevent a virtual function from being overridden ?
- A. nooverride
  - B. final
  - C. noexcept
  - D. terminate
144. The following can be declared as friend in a class ?
- A. an object
  - B. a class
  - C. a public data member
  - D. a private data member
145. Which of the following is not the characteristic of constructor?
- A. They should be declared in the public section
  - B. They can be virtual

- C. They do not have return type.
- D. They can not be inherited

146. What will be printed out if you attempt to compile and run the following code?

```
int i = 3;
switch (i)
{
    default:
        System.out.println("default");
    case 0:
        System.out.println("zero");
    case 1:
        System.out.println("one");
        break;
    case 2:
        System.out.println("two");
}
```

- A. default
- B. default, zero, one
- C. Compiler error
- D. No output

147. What will be the result of compiling and running the following program with the command **java Test hello**?

```
public class Test
{
    static int i;
    static public void main(String[] args)
    {
        do
        {
            System.out.println(args[++i]);
        } while (i < args.length);
    }
}
```

- A. Prints "hello"
- B. Prints "Test"
- C. Code does not compile
- D. Throws an `ArrayIndexOutOfBoundsException`

148. What will be the result of compiling and running the following code fragment?

```
Integer i= new Integer("10");
if (i.toString() == i.toString())
    System.out.println("Equal");
else System.out.println("Not Equal");
```

- A. Compiler error
- B. Prints "Equal"
- C. Prints "Not Equal"
- D. None of the above

149. Which of the following statements is not true about threads?

- A. If the *start()* method is invoked twice on the same Thread object, an exception is thrown at runtime.
- B. The order in which threads were started might differ from the order in which they actually run.
- C. If the *run()* method is directly invoked on a Thread object, an exception is thrown at runtime
- D. If the *sleep()* method is invoked on a thread while executing synchronized code, the lock is not released.

150. What will be the result of an attempt to compile and run the following program?

```
class Test
{
    public static void main(String args[])
    {
        String s1 = "abc";
        String s2 = "abc";
        s1 += "xyz";
        s2.concat("pqr");
        s1.toUpperCase();
        System.out.println(s1 + s2);
    }
}
```

- A. "abcxyzabc"
- B. "abcxyzabcpqr"
- C. "ABCXYZabcpqr"
- D. "ABCXYZabc"