NIC
Scientist B
Previous Year Paper
22 Nov, 2020

SEAL

उम्मीदवार इस पुस्तिका में ऊपर की तरफ लगी हुई सील को खोलकर पृष्ठ संख्या 2 और 3 के मध्य स्थापित OMR उत्तर शीट को निकाल लें।
Candidates should open the seal on the top side of this Booklet and take out the OMR Answer Sheet placed between page no. 2 and 3.

पुस्तिका सं. : Booklet No. : 116823

SCB

परीक्षा प्रश्न-पुस्तिका/EXAMINATION QUESTION BOOKLET

परीक्षा पुस्तिका शृंखला : Test Booklet Series : **C**

निर्धारित समय : 3 घंटे (दृष्टिबाधित उम्मीदवारों के लिए : 4 घंटे)
Time Allowed : 3 Hours (For V.H. Candidates : 4 Hours)

अधिकतम अंक : 120
Maximum Marks : 120

रोल नं. Roll No. : 1 1 2 3 1 3 5 5

उत्तर शीट सं.: Answer Sheet No. : 1 1 6 8 2 3

प्रश्नों के उत्तर देने से पहले निम्नलिखित अनुदेशों को ध्यान से पढ़ लें। इस पुस्तिका में प्रश्न अंग्रेजी में दिए गए हैं।
Read the following instructions carefully before you begin to answer the questions. This booklet contains questions in English.

उम्मीदवारों के लिए अनुदेश

1. प्रश्नों के उत्तर लिखना आरंभ करने से पहले आप इस पुस्तिका की जाँच करके सुनिश्चित कर लें कि इसमें पूरे पृष्ठ (20) हैं तथा कोई पृष्ठ या उसका भाग कम या दुबारा तो नहीं आ गया है। उम्मीदवारों को यह भी जाँच करनी है कि उनको केवल उस स्ट्रीम की सही परीक्षा-पुस्तिका मिली है जिसके लिए उन्होंने आवेदन किया है। यदि आप इस पुस्तिका में कोई त्रुटि पाएं, तो *तत्काल* इसके बदले दूसरी पुस्तिका ले लें।
2. ओ एम् आर उत्तर-शीट, प्रश्न पुस्तिका में ही उपलब्ध रहेगी। ओ एम् आर उत्तर-शीट में विवरण भरने से पहले, आपको ओ एम् आर उत्तर-शीट पर मुद्रित अनुदेशों को सावधानीपूर्वक पढ़ना चाहिए। आपको ओ एम् आर उत्तर-शीट में दिए गए अनुदेशों के अनुसार सावधानीपूर्वक उसमें विवरण और कोड लिखने चाहिए। प्रश्नों के उत्तर वास्तविक रूप में लिखना आरंभ करने से पहले आपको ओ एम् आर उत्तर-शीट में निर्धारित स्थान पर अपने हस्ताक्षर करने चाहिए। इन अनुदेशों का पूर्ण अनुपालन किया जाना चाहिए, ऐसा न किये जाने पर आपकी ओ एम् आर उत्तर-शीट का मूल्यांकन नहीं किया जायेगा। (दृष्टिहीन उम्मीदवारों के लिए यह विवरण लेखक द्वारा भरे जायेंगे। फिर भी, सभी दृष्टिहीन उम्मीदवारों को ओ एम् आर उत्तर-शीट में निर्धारित स्थान पर अपने बाएं हाथ के अंगूठे का निशान अवश्य लगाना चाहिए। इसके अतिरिक्त, जो दृष्टिहीन उम्मीदवार अपना हस्ताक्षर कर सकते हैं, वे अंगूठे के निशान के अलावा अपने हस्ताक्षर भी करें।)
3. ओ एम् आर उत्तर-शीट तीन प्रतियों में होंगी (मूल तथा कार्बन की दो प्रतिलिपियाँ)। परीक्षा समाप्ति के बाद ओ एम् आर की मूल शीट तथा एक कार्बन प्रतिलिपि निरीक्षक को सौंपने के पश्चात् उम्मीदवार अपने साथ एक कार्बन प्रतिलिपि ले जा सकते/सकती हैं। यदि कोई भी उम्मीदवार ऐसा करने में असफल रहता/रहती है तो उसका/उसकी उम्मीदवारी रद्द कर दी जायेगी। यदि कोई उम्मीदवार अपना/अपनी कार्बन प्रतिलिपि में किसी भी प्रकार का फेर-बदल कर उसका दावा करता/करती है तो इस स्थिति में भी उसका/उसकी उम्मीदवारी रद्द की जायेगी।
4. इस प्रश्न-पुस्तिका में 120 बहुविकल्पीय प्रश्न हैं, प्रत्येक प्रश्न के 4 विकल्प दिए गए हैं, (A), (B), (C) और (D)। किसी भी स्थिति में प्रत्येक प्रश्न का केवल एक विकल्प ही सही उत्तर है। यदि आपको एक से अधिक विकल्प सही लगें तो सबसे अधिक उचित एक विकल्प का चुनाव करें और उत्तर-शीट में सम्बंधित प्रश्न के सामने वाले उपयुक्त गोले को काला करें।
5. प्रत्येक **सही** उत्तर के लिए 1 अंक दिया जाएगा और **प्रत्येक गलत उत्तर के लिए 0.25 अंक काट लिया जाएगा।**
6. प्रश्न पुस्तिका में दो भाग हैं : भाग A : सामान्य (42 प्रश्न) और भाग B : तकनीकी (78 प्रश्न)। उम्मीदवार को दोनों भागों के उत्तर लिखना अनिवार्य हैं।
7. गोले को काला करने के लिए केवल काले/नीले बॉल प्वाइंट पेन का प्रयोग करें। गोले को एक बार काला करने के बाद इसको मिटाने या बदलने की अनुमति नहीं है। यदि किसी प्रश्न के सामने एक से ज्यादा गोले काले किये गए हों तो मशीन द्वारा उसके लिए **शून्य अंक** दिया जाएगा।
8. किसी भी स्थिति में उत्तर-शीट को न मोड़ें।
9. उत्तर-पुस्तिका पर कोई भी रफ कार्य नहीं करना है। रफ कार्य के लिए इस पुस्तिका में स्थान दिया गया है।
10. परीक्षा हॉल/कमरों में मोबाइल फ़ोन तथा बेतार संचार साधन पूरी तरह निषिद्ध हैं। उम्मीदवारों को उनके अपने हित में सलाह दी जाती है कि मोबाइल फ़ोन/किसी अन्य बेतार संचार साधन को स्विच ऑफ करके भी अपने पास न रखें। इस प्रावधान का अनुपालन न करने को परीक्षा में अनुचित उपायों का प्रयोग माना जायेगा और उनके विरुद्ध कार्यवाही की जाएगी, जिसमें उनकी उम्मीदवारी रद्द करना भी शामिल है।
11. परीक्षार्थी को अपनी उत्तर-शीट निरीक्षक को सौंपे बिना और उपस्थिति पत्रिका पर हस्ताक्षर किये बिना परीक्षा हॉल/कमरा नहीं छोड़ना चाहिए, ऐसा नहीं करने पर अयोग्य घोषित कर दिया जाएगा।

Instructions to the Candidates

1. Before you start to answer the questions you must check up this booklet and ensure that it contains all the pages (20) and see that no page or portion thereof is missing or repeated. Candidates are also required to check that they have got the right question booklet as per the post applied. If you find any defect in this Booklet, you must get it replaced ***immediately***.
2. OMR Answer-Sheet will be within the Question booklet. Read the instructions printed on OMR Answer-Sheet carefully before filling the information on the OMR Answer-Sheet. You must complete and code the details as per the instructions given in the OMR Answer-Sheet carefully. You must also put your signature on the OMR Answer-Sheet at the prescribed place before you actually start answering the questions. These instructions must be fully complied with, failing which, your OMR Answer-Sheet will not be evaluated. (For V.H. candidates these details will be filled in by the scribe. However, all V.H. candidates must put their left-hand thumb impression at the space provided in the OMR Answer-Sheet. In addition, those V.H. candidates who can sign should also put their signatures in addition to thumb impression.)
3. The OMR Answer-Sheet will be in triplicate (Original and two carbon copies). Candidate has to take one carbon copy (marked as 'candidate copy') with him/her after examination and handover the original OMR along with one carbon copy to invigilator. If candidates fails to handover the original OMR along with one carbon copy to invigilator, his/her candidature will be cancelled. Further, if the candidate tempers with candidate OMR carbon copy and claims for same, in that case also his/her candidature will be cancelled.
4. This question booklet consists of **120** Multiple Choice Questions. Each question has 4 (four) alternatives (A), (B), (C) and (D). In any case only one alternative will be the correct answer. In case if you find more than one correct answer, then choose the most appropriate single option and darken the appropriate circle in the Answer-Sheet in front of the related question.
5. For each **correct** answer One mark will be given and **for each incorrect answer 0.25 marks will be deducted.**
6. Question Booklet consists of two parts : Part A : Generic (having 42 questions) and Part B : Technical (having 78 questions). Candidate has to attempt both parts compulsorily.
7. Use Black/Blue ball point Pen to darken the circle. Answer once darkened is not allowed to be erased or altered. Against any question if more than one circle is darkened, machine will allot **zero mark** for that question.
8. Do not fold Answer-Sheet in any case.
9. No rough work is to be done on the Answer-Sheet. Space for rough work has been provided in this booklet.
10. Mobile phones and wireless communication devices are completely banned in the examination hall/rooms. Candidates are advised not to keep mobile phones/any other wireless communication devices with them even switching it off, in their own interest. Failing to comply with this provision will be considered as using unfair means in the examination and action will be taken against them including cancellation of their candidature.
11. Candidate should not leave the examination hall/room without handing over his/her Answer-Sheet to the invigilator and without signing on the attendance sheet. Failing in doing so, will amount to disqualification.

जब तक आपसे कहा न जाए तब तक प्रश्न–पुस्तिका न खोलें/ DO NOT OPEN THE QUESTION BOOKLET UNTIL YOU ARE TOLD TO DO SO.

मैंने सभी अनुदेशों को स्पष्टत: पढ़कर समझ लिया है और मैं उस पर बाध्य रहूँगा। ऐसा नहीं करने पर मेरी उम्मीदवारी को रद्द करने के विषय में मेरी सहमति होगी।
I have read and understood the instructions clearly and shall abide by the same. Failure to do so shall made me liable for cancellation of my candidature

PART - A
GENERIC AREA

Choose the most appropriate option.

(Q.No. 1 to 42)

Directions for question number 1 to 3 :

Answer the following questions on the basis of the directions given below :

Directions : For the **Assertion (A)** and **Reason (R)** below, choose the correct alternative from the following :

I. Both **(A)** and **(R)** are true and **(R)** is the correct explanation of **(A)**.

II. Both **(A)** and **(R)** are true and **(R)** is not the correct explanation of **(A)**.

III. **(A)** is true but **(R)** is false.

IV. **(A)** is false but **(R)** is true.

1. **Assertion (A) :**

Salt is added to cook food at higher altitudes.

Reason (R) :

Temperature is lower at higher altitudes.

(A) I

(B) II

(C) III

(D) IV

2. **Assertion (A) :**

Ventilators are provided near the roof.

Reason (R) :

Conduction takes place better near the roof.

(A) I

(B) II

(C) III

(D) IV

3. **Assertion (A) :**

Moon cannot be used as a satellite for communication.

Reason (R) :

Moon does not move in the equatorial plane of the Earth.

(A) I

(B) II

(C) III

(D) IV

Directions for question number 4 and 5 :

Consists of a question and two statements, labelled **(1)** and **(2)**, in which certain data are given. You have to decide whether the data given in the statements are sufficient for answering the question. Using the data given in the statements, plus your knowledge of mathematics and everyday facts.

4. How is R related to S ?

Statement (1) :

T, the wife of R's only brother C does not have any siblings.

Statement (2) :

S is T's brother-in-law's wife.

(A) Only **Statement (1)** is required for answering the question

(B) Only **Statement (2)** is required for answering the question

(C) Both Statement together are required to answer the question

(D) Answer cannot be ascertained with the given information

SPACE FOR ROUGH WORK

9+8-6 = 11

9+7-4 = 12

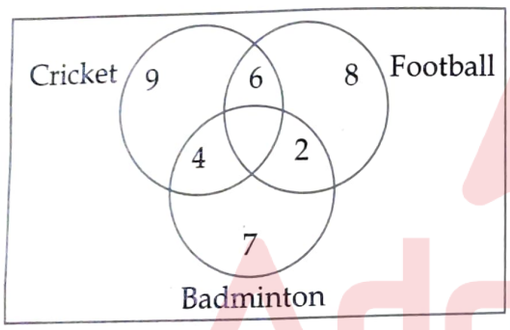
5. What is the Standard Deviation (SD) of the four numbers A, B, C, D ?

Statement (1) :
The sum of A, B, C and D is 24.

Statement (2) :
The sum of the squares of A, B, C and D is 224.

(A) Only **Statement (1)** is required for answering the question
(B) Only **Statement (2)** is required for answering the question
(C) Both Statement together are required to answer the question
(D) Answer cannot be ascertained with the given information

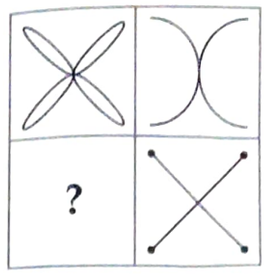
Directions - Question number 6 and 7 are based on the diagram given below :
In a class there are 40 students who play at least one game out of Football, Cricket and Badminton.

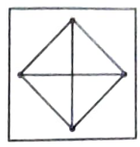
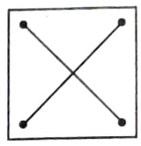
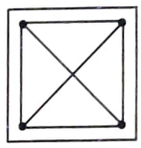
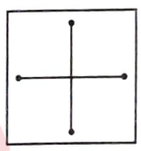


6. What percentage of students play only one game ?
(A) 50%
(B) 60%
(C) 65%
(D) 70%

7. What percentage of students play all the three games ?
(A) 4%
(B) 5%
(C) 8%
(D) 10%

8. Select a suitable figure from the four alternatives that would complete the figure matrix.



(A) 
(B) 
(C) 
(D) 

9. Gopal went to a fruit market with certain amount of money. With this money he can buy either 50 oranges or 40 mangoes. He retains 10% of the money for taxi fare. If he buys 20 mangoes, then the number of oranges he can buy with balance amount is :
(A) 25
(B) 20
(C) 18
(D) 6

10. Number of letter repeated in the given word 'MEASUREMENTS' are indicated in front of each alternative. Identify the correct alternative.
(A) $M_2E_2A_2S_2U_1R_1N_1T_1$
(B) $M_2E_3A_1S_1U_2R_1N_2T_1$
(C) $M_2E_2A_1S_2U_1R_1N_1T_1$
(D) $M_2E_3A_1S_2U_1R_1N_1T_1$

11. What is the value of k for which the following system of equations has no solution :

$2x - 8y = 3$ and $kx + 4y = 10$

(A) -2

(B) 1

(C) -1

(D) 2

12. There are 6 boxes numbered 1, 2, ..., 6. Each box is to be filled up either with a red or a green ball in such a way that at least 1 box contains a green ball and the boxes containing green balls are consecutively numbered. The total number of ways in which this can be done is :

(A) 18

(B) 19

(C) 20

(D) 21

13. If 09/12/2001(DD/MM/YYYY) happens to be Sunday, then 09/12/1971 would have been a :

(A) Wednesday

(B) Tuesday

(C) Saturday

(D) Thursday

14. A player rolls a die and receives the same number of rupees as the number of dots on the face that turns up. What should the player pay for each roll if he wants to make a profit of one rupee per throw of the die in the long run ?

(A) ₹ 2.50

(B) ₹ 2

(C) ₹ 3.50

(D) ₹ 4

15. If a cube with length, height and width equal to 10 cm, is reduced to a smaller cube of height, length and width of 9 cm then reduction in volume is :

(A) 172 cm^3

(B) 729 cm^3

(C) 271 cm^3

(D) None of the options

16. The admission ticket for an Art Gallery bears a password which is changed after every clock hour based on set of words chosen for each day. The following is an illustration of the code and steps of rearrangement for subsequent clock hours.

The Time is 9 a.m. to 3 p.m. Day's first password :

First Batch – 9 a.m. to 10 a.m.
is not ready cloth simple harmony burning

Second Batch – 10 a.m. to 11 a.m.
ready not is cloth burning harmony simple

Third Batch – 11 a.m. to 12 noon
cloth is not ready simple harmony burning

Fourth Batch – 12 noon to 1 p.m.
not is cloth ready burning harmony simple

Fifth Batch – 1 p.m. to 2 p.m.
ready cloth is not simple harmony burning

and so on.

If the password for 11 a.m. to 12 noon was – "soap shy miss pen yet the she", what was the password for the First Batch ?

(A) pen miss shy soap she the yet

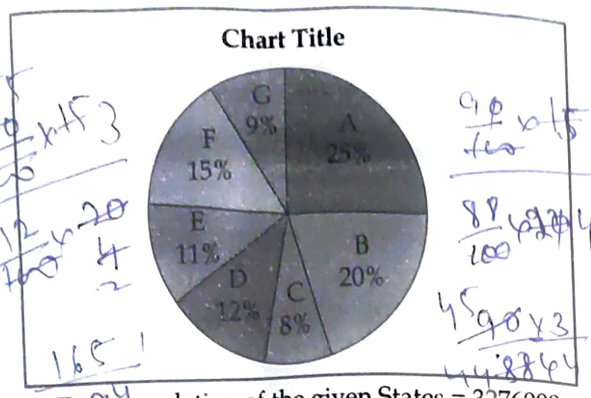
(B) shy miss pen soap yet the she

(C) soap pen miss shy she the yet

(D) miss shy soap pen she the yet

SPACE FOR ROUGH WORK

Directions for question number 17 to 21 : *Study the following graph and the table and answer the questions given below. (Data of different states regarding population of states in the year 2018)*



Total population of the given States = 3276000.

States	Sex and Literacy wise Population Ratio			
	Sex		Literacy	
	M	F	Educated	Non-Educated
A	5	3	2	7
B	3	1	1	4
C	2	3	2	1
D	3	5	3	2
E	3	4	4	1
F	3	2	7	2
G	3	4	9	4

17. The number of males in F in the year 2018 is _____.
(A) 294650
(B) 294840
(C) 301470
(D) 301200

18. _____ is the percentage of total number of males in F, B and D together to the total population of all the given states.
(A) 24%
(B) 17.5%
(C) 28.5%
(D) 29.5%

19. _____ is the ratio of the number of females in G to the number of females in C.
(A) 16 : 5
(B) 16 : 7
(C) 15 : 11
(D) 15 : 14

20. _____ is the total number of non-educated people in A and B in 2018.
(A) 1276040
(B) 1032170
(C) 1081550
(D) 1161160

21. If in the year 2018, population of F is increased by 10% and population of B is increased by 12% as compared to the previous year, then _____ is the ratio of populations of F and B in 2017.
(A) 42 : 55
(B) 62 : 55
(C) 42 : 11
(D) 44 : 5

22. Choose which of the following will be sufficient to find : What time did the bus leave today ?

Statements :

I. The bus normally leaves on time.

II. The scheduled departure is at 12 : 30.

(A) I alone is sufficient while II alone is not sufficient
(B) II alone is sufficient while I alone is not sufficient
(C) Either I or II is sufficient
(D) Neither I nor II is sufficient

SPACE FOR ROUGH WORK

23. In the following question below are given three statements followed by three conclusions numbered I, II and III. You have to take the two statements to be true even if they seem to be at variance from the commonly known facts. Read all the conclusions and then decide which of the given conclusions logically follow from the two given statements, disregarding commonly known facts.

Statements :

Some pigeons are eagles.

All eagles are sparrows.

Some sparrows are not pigeons.

Conclusions :

I. Some sparrows are pigeons.

II. All pigeons are sparrows.

III. All eagles are pigeons.

(A) Only I follows

(B) Only II follows

(C) Only III follows

(D) Both I and III follows

24. Which of these statements reflects a contrast between two flowers ?

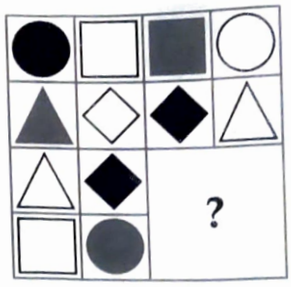
(A) This tulip is as colourful as a rose.

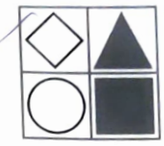
(B) This tulip does not smell as bad as a daffodil.

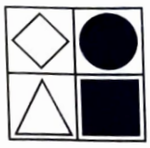
(C) This tulip turns towards light just like sunflower.

(D) This tulip is grown in bunches, like a lotus.

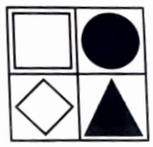
25. Identify the figure that completes the pattern.



(A) 

(B) 

(C) 

(D) 

26. If X says that his mother is the only daughter of Y's mother, then how is Y related to X ?

(A) Brother
(B) Son
(C) Uncle
(D) Father

27. A solid cube of each side 8 cm, has been painted red, blue and black on pairs of opposite faces. It is then cut into cubical blocks of each side 2 cm. How many cubes have no face painted ?

(A) 0
(B) 4
(C) 8
(D) 12

SPACE FOR ROUGH WORK

28. Choose the missing terms out of the given alternatives.

EJO, TYD, INS, XCH, ?

(A) NRW

(B) MRW

(C) MSX

(D) NSX

29. A university library budget committee must reduce exactly five of eight areas of expenditure - I, J, K, L, M, N, O and P - in accordance with the following conditions :

If both I and O are reduced, P is also reduced.

If L is reduced, neither N nor O is reduced.

If M is reduced, J is not reduced.

Of the three areas J, K and N exactly two are reduced.

If both K and N are reduced, which one of the following is a pair of areas neither of which could be reduced ?

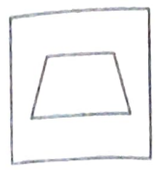
(A) I, L

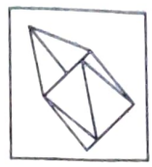
(B) J, L

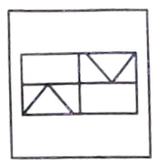
(C) J, M

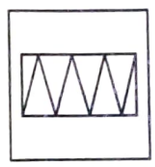
(D) I, J

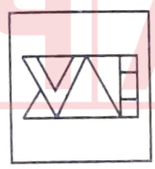
30. Find out the alternative figure which contains the given figure as its part.



(A) 

(B) 

(C) 

(D) 

31. Find the odd one out in the given series :

ZA, RS, DE, JK, PR, LM, YZ, NO

(A) JK

(B) LM

(C) ZA

(D) PR

SPACE FOR ROUGH WORK

32. In an office, 30% of the employees were women and 70% of the employees were above the age of 40 years, out of which 60% are men. Find the percentage of women employees who are above 40 years out of the total number of women employees.

(A) 96%

(B) 93.33%

(C) 70.44%

(D) 80.66%

33. Two taps A and B can fill a tank in 12 minutes and 15 minutes respectively. The tank can be emptied by a third tap C in 6 minutes. If A and B are kept open for 5 minutes in the beginning and then C is opened along with A and B being kept open, the time taken to empty the tank is :

(A) 60 minutes

(B) 45 minutes

(C) 30 minutes

(D) 75 minutes

34. What is the next number 16, 30, 54, 88, 132, ...

(A) 186

(B) 188

(C) 190

(D) 206

35. Arjun by car takes double the time taken by bus to travel from Delhi to Agra. What is the Speed of the Bus if the Speed of Car is 40 km/hr ?

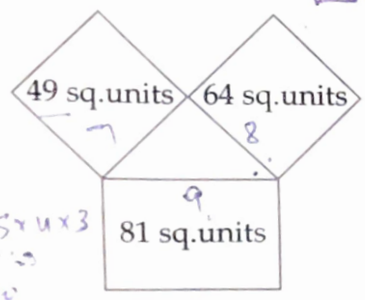
(A) 40 km/hr

(B) 60 km/hr

(C) 80 km/hr

(D) 30 km/hr

36. Three squares are there as shown on the three sides of the triangle; find the area of the triangle from the respective areas of the squares:



(A) $15\sqrt{5}$

(B) $12\sqrt{5}$

(C) $2\sqrt{5}$

(D) 1

37. In a group of 24 members, each membe drinks either tea or coffee or both. If 15 c them drink tea and 18 drink coffee, fin the probability that a person selected fro the group drinks both tea and coffee.

(A) 1/8

(B) 3/8

(C) 5/24

(D) None of the options

SPACE FOR ROUGH WORK

Directions for question number 38 to 40 :

Read the following information carefully and then answer the questions given below it.

A, B, C, D, E and F are six members of a family.

There are two married couples among them.

C is the mother of A and F.

E is the father of D.

A is the grandson of B.

The total number of female members in the family is three.

38. Which of the following pairs is one of the married couples ?

(A) E - F

(B) B - D

(C) E - B

(D) A - F

39. How is B related to F ?

(A) Sister

(B) Grandmother

(C) Wife

(D) Data inadequate

40. How is F related to A ?

(A) Brother

(B) Daughter

(C) Son

(D) None of the options

Directions for question number 41 and 42 :

Study the information below and answer questions based on it.

Five of India's leading models are posing for a photograph promoting "World Peace and Understanding". But then, Sachin Malhotra the photographer is having a tough time getting them to stand in a straight line, because Natasha refuses to stand next to Jessica since Jessica had said something about her in a leading gossip magazine. Rachel and Anna want to stand together because they are good friends. Ria on the other hand cannot get along well with Rachel, because there is some talk about Rachel scheming to get a contract already awarded to Ria. Anna believes her friendly astrologer who has asked her to stand at the extreme right for all group photographs. Finally, Sachin managed to pacify the girls and got a beautiful picture of five beautiful girls smiling beautifully in a straight line, promoting world peace.

41. If Natasha stands at the extreme left, who is standing second from left ?

(A) Cannot say

(B) Jessica

(C) Rachel

(D) Ria

42. If Anna's astrologer tells her to stand second from left and Natasha decides to stand second from right, then who is the girl standing at the extreme right ?

(A) Rachel

(B) Jessica

(C) Ria

(D) None of the options

SPACE FOR ROUGH WORK

PART - B
TECHNICAL AREA

Choose the most appropriate option.

(Q.No. 43 to 120)

43. Which table is used in MS DOS for linked list allocation ?

(A) TLB

(B) Page Table

(C) FAT

(D) Index Table

44. One disk queue with requests for I/O to blocks on cylinders. The Request are in the following manner :

98 183 37 122 14 124 65 67

Considering SSTF (shortest seek time first) scheduling, the total number of head movements is, if the disk head is initially at 53 is :

(A) 236

(B) 246

(C) 220

(D) 240

45. Which of the following machine model can be used in a necessary and sufficient sense for lexical analysis in modern computer language ?

(A) Deterministic Push down Automata

(B) Finite Automata

(C) Non-Deterministic Finite Automata

(D) Turing Machine

46. Point out the wrong statement :

(A) Non-Relational databases require that schemas be defined before you can add data.

(B) NoSQL databases are built to allow the insertion of data without a predefined schema.

(C) NewSQL databases are built to allow the insertion of data without a predefined schema.

(D) All of the options.

47. An attribute(s) that is used to look up for records in a file is called a :

(A) Function key

(B) Catalog key

(C) Access key

(D) Search key

48. An instance of relational schema R(A, B, C) has distinct values of A including NULL values. Which one of the following is true ?

(A) A is a candidate key

(B) A is not a candidate key

(C) A is a primary key

(D) Both "A is a candidate key" and "A is a primary key"

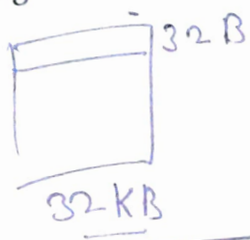
49. A direct mapped cache is of size 32 KB and has block size 32 Bytes. CPU also generates 32 bit address. Number of bits needed for indexing the cache :

(A) 14

(B) 15

(C) 10

(D) 17



SPACE FOR ROUGH WORK

50. Most NoSQL databases support automatic _____ meaning that you get high availability and disaster recovery.

(A) Processing
(B) Scalability
(C) Replication
(D) All of the options

51. Given the truth table of a Binary Operation $ as follows :

X	Y	X $ Y
1	0	1
1	1	1
0	1	0
0	0	1

Identify the matching Boolean Expression.

(A) X $ ¬ Y
(B) ¬ X $ Y
(C) ¬ X $ ¬ Y
(D) none of the options

52. Which type of linked list stores the address of the header node in the next field of the last node ?

(A) Singly linked list
(B) Circular linked list
(C) Doubly linked list
(D) Hashed list

53. Which element is used to define discrete unit of content such as a blogpost, comment and so on ?

(A) section
(B) class
(C) article
(D) none of the options

54. In which modulation discrete values of carrier frequencies is used to transmit binary data ?

(A) Phase Shift Keying
(B) Amplitude Shift Keying
(C) Frequency Shift Keying
(D) Disk Shift Keying

55. The recurrence relation $T(n)=7T(n/7)+n$ has the solution :

(A) O(n)
(B) O(*log*n)
(C) O(n*log*(n))
(D) $O(n^2)$

56. Consider the algorithm that solves problems of size n by recursively solving two sub problems of size n−1 and then combining the solutions in constant time. Then the running time of the algorithm would be :

(A) O(n)
(B) O(*log*n)
(C) O(n*log*n)
(D) $O(n^2)$

57. What is the advantage of bubble sort over other sorting techniques ?

(A) It is faster
(B) Consumes less memory
(C) Detects whether the input is already sorted
(D) All of the options

58. You are working with a network that is 172.16.0.0 and would like to support 600 hosts per subnet. What subnet mask should you use ?

(A) 255.255.192.0

(B) 255.255.224.0

(C) 255.255.252.0

(D) None of the options

59. On computers where there are multiple operating system, the decision to load a particular one is done by _____.

(A) PCB

(B) Inode

(C) File Control Block

(D) Boot Loader

60. Contiguous memory allocation having variable size partition suffers from :

(A) External Fragmentation

(B) Internal Fragmentation

(C) Both External and Internal Fragmentation

(D) None of the options

61. _____ is a partitioning of single physical server into multiple logical servers.

(A) Virtualization

(B) Private cloud

(C) Hybrid cloud

(D) Public cloud

62. In _____, other nodes verify the validity of the block by checking that the hash of the data of the block is less than a preset number.

(A) Proof of Burn

(B) Proof of STAKE

(C) Proof of Work

(D) All of the options

63. The number of tokens in the following C statement is

printf("i=%d, &i=%x", i, &i);

(A) 8

(B) 4

(C) 7

(D) 10

64. In the congestion avoidance algorithm, the size of the congestion window increases _____ until congestion is detected.

(A) Exponentially

(B) Additively

(C) Multiplicatively

(D) Suddenly

65. Which of the following can be used when creating a pool of global addresses instead of the netmask command ?

(A) / (slash notation)

(B) prefix-length

(C) no mask

(D) block-size

SPACE FOR ROUGH WORK

66. Consider a software program that is artificially seeded with 100 faults. While testing this program, 159 faults are detected, out of which 75 faults are from those artificially seeded faults. Assuming that both real and seeded faults are of same nature and have same distribution, the estimated number of undetected real faults is _____.
(A) 28
(B) 175
(C) 56
(D) 84

67. What is the best case complexity of QuickSort ?
(A) O(n*log*n)
(B) O(*log*n)
(C) O(n)
(D) $O(n^2)$

68. Consider a software project with the following information domain characteristic for calculation of function point metric.
Number of external inputs (I) = 30
Number of external output (O) = 60
Number of external inquiries (E) = 23
Number of files (F) = 08
Number of external interfaces (N) = 02
It is given that the complexity weighting factors for I, O, E, F and N are 4, 5, 4, 10 and 7, respectively. It is also given that, out of fourteen value adjustment factors that influence the development effort, four factors are not applicable, each of the other four factors have value 3, and each of the remaining factors have value 4. The computed value of function point metric is _____.
(A) 612.06
(B) 212.05
(C) 305.09
(D) 806.9

69. Which of the following techniques deals with sorting the data stored in the computer's memory ?
(A) Distribution sort
(B) Internal sort
(C) External sort
(D) Radix sort

70. Considering binary relationships, possible cardinality ratios are :
(A) one : one
(B) 1 : N
(C) M : N
(D) All the options

71. _____ is automatically loaded and operates as part of browser.
(A) Add-ons
(B) Plug-ins
(C) Utilities
(D) Widgets

72. Which open addressing technique is free from Clustering problems ?
(A) Linear probing
(B) Quadratic probing
(C) Double hashing
(D) Rehashing

73. Set of key attributes that identify weak entities related to some owner entity is classified as :
(A) Structural key
(B) String key
(C) Partial key
(D) Foreign key

74. Data leakage threats are done by internal agents. Which of them is not an example of an internal data leakage threat ?

(A) Data leak from stolen credentials from desk

(B) Data leak by partners

(C) Data leak by 3rd Party apps

(D) All of the options

75. Let $X_1, \ldots X_{50}$ be independent random variables following N(0, 1) distribution. Let $Y = \Sigma_{i=1}^{50} X_i^2$, and E(Y) = a and Var(Y) = b. Then, the ordered pair (a, b) is :

(A) (50, 100)

(B) (50, 50)

(C) (25, 50)

(D) (25, 100)

76. Which of the following is component of Hadoop ?

(A) YARN

(B) HDFS

(C) Map reduce

(D) All of the options

77. What is the basis of KVL ?

(A) Conservation of charge

(B) Conservation of energy

(C) Conservation of power

(D) All of the options

78. _____ tells a firewall about how to reassemble a data stream that has been divided into packets.

(A) The source routing feature

(B) The number in the header's identification field

(C) The destination IP address

(D) The header checksum field in the packet header

79. Which sorting algorithm sorts by moving the current data element past the already sorted values and repeatedly interchanges it with the preceding value until it is in its correct place ?

(A) Insertion sort

(B) Internal sort

(C) External sort

(D) Radix sort

80. If x, y, z are Boolean variable then $(x+\bar{y})\,(x\cdot\bar{y}+x\cdot z)\,(\bar{x}\cdot\bar{z}+\bar{y})$ is equal to :

(A) $x\cdot\bar{y}$

(B) $x\cdot\bar{y}+z$

(C) $x\cdot\bar{z}$

(D) none of the options

81. The best running time is defined as/obtained as/by :

(A) the least or smallest of all the running times the algorithm takes, on inputs of a particular size.

(B) an input that requires maximum computations or resources.

(C) averaging the different running times for all inputs of a particular kind.

(D) none of the options.

82. Suppose we have to insert the following sequence of keys into an empty binary search tree :

5, 7, 45, 60, 50, 23, 15, 54

What would be the height of binary search tree ?

(A) 3

(B) 4

(C) 5

(D) 6

83. The _____ command will show you the translation table containing all the active NAT entries.

(A) show ip nat translations

(B) show ip nat tl

(C) show ip nat states

(D) none of the options

84. Limitations of the XML Data Type are :

(A) It cannot be compared or sorted. This means an XML data type cannot be used in a GROUP BY statement.

(B) It cannot be used as a key column in an index.

(C) The value() method of the XML data type returns a scalar value, so it can be specified anywhere where scalar values are allowed.

(D) All of the options.

85. A special PCM system uses 32 channels of data, one whose purpose is an identification (ID) and synchronization. The sampling rate is 4 kHz. The word length is 5 bits. Find the serial data rate.

(A) 1280 kHz

(B) 160 kHz

(C) 320 kHz

(D) 640 kHz

86. Consider the basic COCOMO model where E is the effort applied in person-months, D is the development time in chronological months, KLOC is the estimated number of delivered lines of code (in thousands) and a_b, b_b, c_b, d_b have their usual meanings. The basic COCOMO equations are of the form.

(A) $E = a_b(KLOC)\ exp(b_b)$, $D = c_b(E)\ exp(d_b)$

(B) $D = a_b(KLOC)\ exp(b_b)$, $E = c_b(D)\ exp(d_b)$

(C) $E = a_b\ exp(b_b)$, $D = c_b(KLOC)\ exp(d_b)$

(D) $E = a_b\ exp(d_b)$, $D = c_b(KLOC)\ exp(b_b)$

87. In an IPv6 header, the traffic class field is similar to the _____ field in the IPv4 header.

(A) TOS field

(B) Fragmentation field

(C) Fast Switching

(D) Option field

88. If main memory access time is 400 µs, TLB access time 50 µs, considering TLB hit 90%, what will be the overall access time ?

(A) 800 µs

(B) 490 µs

(C) 485 µs

(D) 450 µs

89. In _____ VMs do not simulate the underlying hardware.

(A) Para Virtualization

(B) Full Virtualization

(C) Hardware-Assisted Virtualization

(D) Network Virtualization

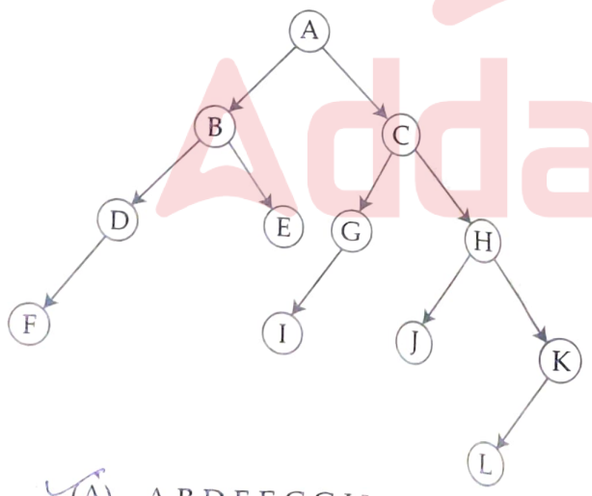
SPACE FOR ROUGH WORK

90. One-megabyte memory storage in form of bytes is equal to _____.
(A) 1024 bytes
(B) 1024^2 bytes
(C) 1024^3 bytes
(D) 1024^4 bytes

91. An expression in the domain relational calculus is of the form :
(A) $\{P(x_1, x_2, \ldots, x_n) \mid < x_1, x_2, \ldots, x_n >\}$
(B) $\{x_1, x_2, \ldots, x_n \mid < x_1, x_2, \ldots, x_n >\}$
(C) $\{x_1, x_2, \ldots, x_n \mid x_1, x_2, \ldots, x_n\}$
(D) $\{< x_1, x_2, \ldots, x_n > \mid P(x_1, x_2, \ldots, x_n)\}$

92. Which of the following is correct Content-Type header that a server side script should send for SSE in HTML5 ?
(A) Content-Type: text/event-stream
(B) Content-Type: text/application-stream
(C) Content-Type: text/data-stream
(D) None of the options

93. The Preorder traversal of a tree given below is :



(A) A B D F E C G I H J K L
(B) A B C D E G H F I J K L
(C) A B E D F C G H I J K L
(D) A B D F E C G I J H K L

94. 58000 LOC gaming software is developed with effort of 3 person-year. What is the productivity of person-month ?
(A) 1.9 KLOC
(B) 1.6 KLOC
(C) 4.8 KLOC
(D) 4.2 KLOC

95. If one uses straight two-way merge sort algorithm to sort the following elements in ascending order 20, 47, 15, 8, 9, 4, 40, 30, 12, 17 then the order of these elements after the second pass of the algorithm is :
(A) 8, 9, 15, 20, 47, 4, 12, 17, 30, 40
(B) 8, 15, 20, 47, 4, 9, 30, 40, 12, 17
(C) 15, 20, 47, 4, 8, 9, 12, 30, 40, 17
(D) 4, 8, 9, 15, 20, 47, 12, 17, 30, 40

96. Identify the odd one out.
(A) Amazon web service
(B) Microsoft Azure
(C) Google cloud Platform
(D) Twitter Platform

97. Calculate the modulation percentage if the modulating signal is 8 V and carrier is of 12 V ?
(A) 50
(B) 67
(C) 150
(D) 33

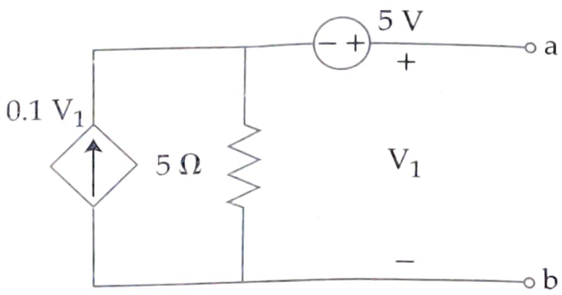
98. In an operating system, processes that are terminated but, for some reason must have its task structure in the process table are referred as _____.
(A) Zombies
(B) Orphans
(C) Parent Process
(D) Child Process

SPACE FOR ROUGH WORK

99. How to specify the comment in the XML document ?

(A) <?-- -->
(B) <!-- --!>
(C) <!-- -->
(D) </-- -->

100. The resistance to be connected across terminal a, b for maximum power transfer to it is :



(A) 40 Ω
(B) 5 Ω
(C) 2.5 Ω
(D) 10 Ω

101. Which of the following property is related to a cryptographic hash functions ?

(A) One way Function
(B) Inversible
(C) Non-Deterministic
(D) All of the options

102. Debugger is a program that :

(A) Allows to examine and modify the contents of registers
(B) Allows to set breakpoints, execute a segment of program and display contents of register
(C) Does not allow execution of a segment of program
(D) All the options

103. The program written for binary search, calculates the midpoint of the span as mid : = (Low + High)/2. The program works well if the number of elements in the list is small (about 32,000) but it behaves abnormally when the number of elements is large. This can be avoided by performing the calculation as :

(A) mid := (High – Low)/2 + Low
(B) mid := (High – Low +1)/2
(C) mid := (High – Low)/2
(D) mid := (High + Low)/2

104. To the detection of up to 5 errors in all cases, the minimum Hamming distance in a block code must be _____.

(A) 5
(B) 6
(C) 10
(D) 8

105. In which of the following hash functions, do consecutive keys map to consecutive hash values ?

(A) Division method
(B) Multiplication method
(C) Folding method
(D) Mid-square method

106. Binary search tree contains the values 1, 2, 3, 4, 5, 6, 7, 8. The tree is traversed in pre-order and the values are printed out. Which of the following sequences is a valid output ?

(A) 53124786
(B) 53126487
(C) 53241678
(D) 53124768

107. The number of 4 digit numbers which contain not more than two different digits is :

(A) 576
(B) 567
(C) 513
(D) 504

108. PI in XML specification stands for _____.

(A) priceless instruction
(B) processing instruction
(C) polymorphic inheritance
(D) primary instruction

109. Consider a Simple Checkpointing Protocol and the following set of operations in the log.

(start, T4); (write, T4, y, 2, 3); (start, T1); (commit, T4); (write, T1, z, 5, 7);

(Checkpoint);

(start, T2); (write, T2, x, 1, 9); (commit, T2); (start, T3); (write, T3, z, 7, 2); if a crash happens now and the system tries to recover using both undo and redo operations, what are the contents of the undo list and the redo list ?

(A) Undo : T3, T1; Redo T2
(B) Undo : T3, T1; Redo T2, T4
(C) Undo : none; Redo T2, T4, T3, T1
(D) Undo : T3, T1, T4; Redo T2

110. _____ possible labels are allowed in the first level of generic domain.

(A) 10
(B) 12
(C) 16
(D) none of the options

111. Typical time requirement for operations on queues is :

(A) O(1)
(B) O(n)
(C) O(*log*n)
(D) $O(n^2)$

112. Which of the following tag is used intended for navigation in HTML5 ?

(A) nav
(B) footer
(C) section
(D) navigation tag

113. Which of the following Page Replacement Algorithm suffers from the belady's anomaly ?

(A) LRU
(B) Optimal Page Replacement
(C) FIFO
(D) Both LRU and FIFO

114. Consider a control unit generating the control signals. These control signals are divided into five mutually exclusive groups as shown below :

Groups	G1	G1	G1	G1	G1
Control Signals	3	7	10	12	2

How many bits are saved using the Vertical Micro-programmed instead of Horizontal Micro-programmed control unit ?

(A) 14
(B) 34
(C) 20
(D) None

SPACE FOR ROUGH WORK

115. _____ uses pretty good privacy algorithm.

(A) Electronic mails

(B) File encryption

(C) Both Electronic mails and File encryption

(D) None of the options

116. _____ has a feature of remote access through which a customer can access the data from anywhere and at any time with the help of internet connection.

(A) IaaS

(B) PaaS

(C) NaaS

(D) SaaS

117. The physical location of a record is determined by a mathematical formula that transforms a file key into a record location is :

(A) B-Tree File

(B) Hashed File

(C) Indexed File

(D) Sequential File

118. In classful addressing, a large part of the available addresses are _____.

(A) Dispersed

(B) Blocked

(C) Wasted

(D) Reserved

119. Match the following :

(1) Waterfall model	(a) Specifications can be developed incrementally
(2) Evolutionary model	(b) Re-usability in development
(3) Component-based software engineering	(c) Explicit recognition of risk
(4) Spiral development	(d) Inflexible partitioning of the project into stages

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

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

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

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

120. Which one of the following statements is incorrect ?

(A) The number of regions corresponds to the cyclomatic complexity.

(B) Cyclomatic complexity for a flow graph G is $V(G) = N - E + 2$, where E is the number of edges and N is the number of nodes in flow graph.

(C) Cyclomatic complexity for a flow graph G is $V(G) = E - N + 2$, where E is the number of edges and N is the number of nodes in flow graph.

(D) Cyclomatic complexity for a flow graph G is $V(G) = P + 1$, where P is the number of predicate nodes contained in the flow graph G.

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SPACE FOR ROUGH WORK

NIELIT/NIC/2020/1 WRITTEN EXAMINATION 22/11/2020
SCIENTIST B ANSWER KEY - SERIES C

Question	Answer
1	B
2	C
3	A
4	C
5	C
6	B
7	D
8	C
9	B
10	D
11	C
12	D
13	D
14	A
15	C
16	B
17	B
18	C
19	D
20	D
21	A
22	D
23	A
24	B
25	A
26	C
27	C
28	B
29	B
30	C
31	D
32	B
33	B
34	A
35	C
36	B
37	B
38	C
39	B
40	D

Question	Answer
41	D
42	B
43	C
44	A
45	B
46	A
47	D
48	B
49	C
50	C
51	A
52	B
53	B
54	C
55	C
56	D
57	C
58	C
59	D
60	A
61	A
62	C
63	D
64	B
65	B
66	A
67	A
68	A
69	B
70	D
71	B
72	C
73	C
74	C
75	A
76	D
77	B
78	A
79	A
80	A

Question	Answer
81	A
82	D
83	A
84	D
85	D
86	A
87	A
88	B
89	A
90	B
91	D
92	A
93	A
94	B
95	B
96	D
97	B
98	A
99	C
100	D
101	A
102	B
103	A
104	B
105	A
106	D
107	A
108	B
109	A
110	D
111	A
112	A
113	C
114	C
115	C
116	C
117	B
118	C
119	B
120	B