SEAL

उम्मीदवार इस पुस्तिका के सबसे ऊपरी सील को खोलकर पृष्ठ संख्या 2 और 3 के मध्य स्थापित OMR उत्तर पुस्तिका को निकाल लें।
Candidates should open the top side of the seal of this Booklet and take out the OMR Answer Sheet placed at page no. 2 and 3.

पुस्तिका सं.: 126573
Booklet No. :

SB परीक्षा प्रश्न-पुस्तिका/EXAMINATION QUESTION BOOKLET

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

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. :

उत्तर शीट सं.:
Answer Sheet No. :

प्रश्नों के उत्तर लिखना आरम्भ करने से पहले आप 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 (1-20) 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 पुस्तिका 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 सावधानी पूर्वक पढ़ना चाहिए। आपको ओ एम् आर उत्तर-पुस्तिका में दिए गए अनुदेशों के अनुसार सावधानी पूर्वक उसमें विवरण और कोड लिखने चाहिए। प्रश्नों के उत्तर वास्तविक रूप में लिखना आरंभ करने से पहले आपको ओ एम् आर उत्तर-पुस्तिका 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 पत्रक तीन प्रतियों में होंगी (मूल तथा कार्बन की दो प्रतिलिपियाँ) परीक्षा समाप्ती के बाद ओ.एम्.आर. का मूल पत्रक 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 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 है इस मामले में भी उसका/उसकी उम्मीदवारी रद्द की जायेगी।
4. इस प्रश्न-पुस्तिका में 120 बहुविकल्पीय प्रश्न हैं, (भाग ए और भाग बी दोनों में प्रत्येक में 60 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 पुस्तिका 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. उम्मीदवार को दोनों भागों के उत्तर लिखना अनिवार्य है।
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-पुस्तिका 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 (1-20) 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 book 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 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 candidate fails to handover the original OMR along with one carbon copy to invigilator, his/her candidature will be cancelled. Further, if the candidate tampers with candidate OMR carbon copy and claims for same, in that case also his/her candidature will be cancelled.
4. This booklet consists of 120 Multiple Choice Questions. (Section A and Section B both contains 60 Questions each). 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 questions.
5. For each **correct** answer One mark will be given and for each **incorrect** answer **0.25 marks will be deducted.**
6. Candidate has to attempt both sections 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 आप से कहा न जाए तब तक प्रश्न-पुस्तिका न खोलें
DO NOT OPEN THE QUESTION BOOKLET UNTIL YOU ARE TOLD TO DO SO.

उम्मीदवार का नाम/Name of Candidate : _____ उम्मीदवार के हस्ताक्षर/Signature of Candidate : _____

SEAL

SEAL

SECTION - A

Direction for the question numbers 1 - 5 :

Study the following information and answer the questions given.

There are seven girls sitting in a circle – Aina, Bina, China, Dipa, Elina, Fiona and Gita. Five of them are facing the centre while two of them are facing opposite to the centre. China sits third to the left of Dipa and both are facing the centre. Elina is neither an immediate neighbour of Dipa nor of China. The one sitting exactly between Dipa and Fiona is facing opposite to the centre. Gita sits third to the right of Aina and Gita is facing the centre. One of Bina's neighbour is facing opposite to the centre.

1. Who is sitting to the immediate left of Elina ?
   (A) China
   (B) Gita
   (C) Bina
   (D) Aina

2. Who is sitting second to the left of Aina ?
   (A) China
   (B) Gita
   (C) Elina
   (D) Bina

3. Which of the following pairs represents persons, facing opposite to the centre ?
   (A) Aina and Fiona
   (B) Elina and Fiona
   (C) Aina and Elina
   (D) Cannot be determined

4. If all the persons are asked to sit in a clockwise direction in an alphabetical order starting from Aina, the position of how many will remain unchanged, excluding A ?
   (A) Three
   (B) One
   (C) Two
   (D) None

5. What is the position of Fiona with respect to Bina ?
   (A) Fourth to the left
   (B) Second to the right
   (C) Third to the right
   (D) None of the options

Study the following information carefully and answer questions 6 - 10 :

Seven backpack travellers are travelling in a train compartment with III tier sleeper berth – Bob, Mop, Tom, Roy, Kos, Hog and Don. Each of them has a different profession of Architect, Doctor, Engineer, Journalist, Lawyer, Pathologist and Pharmacist. They occupied two lower berths, three middle berths and two upper berths. Bob, the Engineer is not on the upper berth. The architect is the only other person who occupies the same type of berth as that of Bob. Mop and Hog are not on the middle berth and their professions are Pathologist and Lawyer respectively. Tom is a Pharmacist. Don is neither a journalist nor an Architect. Kos occupies same type of berth as that of the Doctor.

6. What is Don's profession ?
   (A) Doctor
   (B) Engineer
   (C) Lawyer
   (D) Pharmacist

SPACE FOR ROUGH WORK

7. Which of the following pairs occupy the lower berth ?

(A) Bob - Don

(B) Bob - Kos

(C) Bob - Tom

(D) None of the options

8. Who is the Architect ?

(A) Don

(B) Hog

(C) Roy

(D) Data inadequate

9. Which of the following combination of person - berth - profession is **correct** ?

(A) Roy - Lower - Journalist

(B) Roy - Lower - Architect

(C) Don - Upper - Doctor

(D) Kos - Upper - Lawyer

10. Which of the following group occupies middle berth ?

(A) Don - Kos - Roy

(B) Don - Hog - Tom

(C) Hog - Kos - Tom

(D) Don - Kos - Tom

Direction for question numbers 11 - 15 :

Select one sentence to complete the given statement in the form of a small paragraph. For each item you are given the frame of a 3 - sentence paragraph. The middle sentence has been removed. Three possible fillers (i, ii, iii) are provided for this gap (...). Any one of them, OR more than one OR none of them might fit. The completed statement must be a compact and well organised presentation of the idea indicated by the first and third sentence. Select the appropriate answer option from A. to D. and indicate it.

11. I am pleased that you have published my article 'Managing Publicity'. (...) As I have used company materials this omission has caused me some embarrassment.

(i) However, you have failed to indicate my company affiliation along with my name.

(ii) The editor has done a good job as shortening my rather long original text.

(iii) But there is no reference to my position as HRD head at AA Consultants.

The blank can be filled by :

(A) only (i)

(B) only (ii)

(C) only (iii)

(D) (i) or (ii)

SPACE FOR ROUGH WORK

12. The fight to preserve the environment calls for good science. (...). There is no point in environmental science reports that get locked away in secret government files.

(i) Strong financial support from the government is essential.

(ii) The voluntary sector too should take bold initiatives.

(iii) This implies a culture of openness and transparency, not just funding.

The blank can be filled by :

(A) only (i)

(B) only (ii)

(C) only (iii)

(D) (i) or (iii)

13. Teachers and professionals imparting technical training use speech, writing and diagrams in various combinations (...) Responding to this the Technical Education Council has recommended a course on "communication theory" as common core item.

(i) Yet technical students receive no instruction in the theory and use of information structures in communication.

(ii) Soon interactive video will be a common feature of technical education.

(iii) Steadily failing costs have brought sophisticated information technology to the door of the typical classroom.

The blank can be filled by : .

(A) only (i)

(B) only (ii)

(C) only (iii)

(D) (i) or (ii)

14. The new telecom companies take a radical approach to product development (..) They think instead of what consumers want and then develop the needed technology.

(i) They invest very heavily in state-of-art technology.

(ii) They do not rely primarily on simulated studies product acceptability.

(iii) They do not invent a product with old technology and ask Marketing to sell it.

The blank can be filled by :

(A) only (i)

(B) only (ii)

(C) only (iii)

(D) (i) or (ii)

15. Most people have certain prejudices against certain types or styles of writing. (.....) But these are common and meaningful modes of communication that we need to study and understand.

(i) For example, popular science and children's fiction are considered unintellectual.

(ii) Some of us would regard 'Sunday magazine' journalism and advertising as cheap and even improper.

(iii) Great essayists have always been a source of inspiration to young writers.

The blank can be filled by :

(A) only (i)

(B) only (ii)

(C) only (iii)

(D) (i) or (ii)

SPACE FOR ROUGH WORK

Read the following carefully and answer questions 16 - 19 :

Professor Bhatnagar works only on Sundays, Mondays, Tuesdays, Thursdays and Fridays. She performs four different activities-lecturing, conducting quizzes, evaluating quizzes and working on consultancy projects. Each working day she performs exactly one activity in the morning and exactly one activity in the afternoon. During each week her work Schedule MUST satisfy the following restrictions.

She conducts quizzes on exactly three mornings. If she conducts quizzes on Sunday, she does not conduct a quiz on Monday. She lectures in the afternoon on exactly two consecutive calendar days. She evaluates quizzes on exactly one morning and three afternoons. She works on consultancy project on exactly one morning. On Friday, she neither lectures nor conducts quizzes.

16. Which one of the following statements must be **true** ?

(A) She works on consultancy project on one of the days on which she evaluates quizzes.

(B) There is one day on which she evaluates quizzes both in the morning and in the afternoon.

(C) She lectures on one of the days on which she conducts quiz.

(D) She lectures on one of the days on which evaluates quizzes.

17. If the Professor conducts a quiz on Monday, then her schedule for evaluating quizzes could be :

(A) Tuesday morning, Tuesday afternoon, Thursday afternoon, Friday afternoon.

(B) Sunday morning, Sunday afternoon, Thursday morning, Thursday afternoon.

(C) Sunday afternoon, Tuesday morning, Tuesday afternoon, Friday afternoon.

(D) Tuesday afternoon, Thursday afternoon, Friday morning, Friday afternoon.

18. On Tuesdays, the Professor could be scheduled to :

(A) Conduct a quiz in the morning and lecture in the afternoon.

(B) Evaluate quizzes in the morning and evaluate quizzes in the afternoons.

(C) Work on a consultancy project in the morning and conduct a quiz in the afternoon.

(D) Lecture in the morning and evaluate quizzes in the afternoon.

19. Which one of the following must be a day on which Professor starts lectures ?

(A) Friday

(B) Wednesday

(C) Thursday

(D) Monday

SPACE FOR ROUGH WORK

20. _____ is **not** an equatorial crop.

(A) Coconut

(B) Rubber

(C) Oil Palm

(D) Banana

21. From July 1, 2017, the nation wide GST (Goods and Services Tax) has been rolled out in India, making the country a single market. The current size of Indian economy is _____.

(A) USD 1 Trillion

(B) USD 2 Trillion

(C) USD 3 Trillion

(D) USD 4 Trillion

22. A significant compassionate outcome of technology is the greater dignity and value that it imparts to human labour. In a highly developed society, there is no essential difference between Brahmin and Shudra, Muslim, Christian or Hindu; they are equally useful and hence equally valuable for in the industrial society individual productivity fixes the size of the pay cheque and this fixes social status.

The passage best supports the statement that :

(A) technology decides individual's social status.

(B) castes and religions are man-made.

(C) human labour has dignity and value.

(D) all individuals, irrespective of caste and creed, are born equal.

23. _____ is a **correct** set of two official languages of the United Nations.

(A) Hindi and Chinese

(B) Arabic and Chinese

(C) Japanese and Chinese

(D) Chinese and Japanese

24. In a certain code language, Zat Poo, Tim means Eat Good Mangoes; Pus Tim Sim means Mangoes and Sweets and Sim Poo Kit means Purchase Good sweets. Which word in that language means Good ?

(A) Poo

(B) Pus

(C) Tim

(D) Sim

25. The invention of "swarm intelligence" has been possible because of _____.

(A) Phenology

(B) Phrenology

(C) Bionomics

(D) Bionics

26. National Remote Sensing Agency situated in _____.

(A) Bangalore

(B) Dehradun

(C) Shadnagar

(D) Chennai

27. _____ is **not** an example of complementary goods.

(A) Printers and Ink Cartridges

(B) Tea and Sugar

(C) Mobile phones and SIM cards

(D) Tea and Coffee

28. _____ is **NOT** related to the World Trade Organization (WTO).

(A) Multifiber Agreement

(B) General Agreement on Trade and Services

(C) Multilateral Agreement on Investment

(D) Agreement on Agriculture

29. The joint military training exercise "YudhAbhyas - 2017" was conducted between India and _____.

(A) United States

(B) Russia

(C) France

(D) Germany

30. _____ is **not** present in animal cells.

(A) Cell walls

(B) Mitochondria

(C) Ribosomes

(D) Cytoplasm

31. _____ was the first paper currency issued by RBI.

(A) ₹ 1 Note

(B) ₹ 2 Note

(C) ₹ 5 Note

(D) ₹ 100 Note

32. _____ are the most and the least electronegative elements in the periodic table.

(A) Fluorine and Caesium

(B) Hydrogen and Helium

(C) Carbon and Oxygen

(D) Chlorine and Fluorine

33. (i) All the office spaces on the 8th floor have wall-to-wall carpeting.

(ii) No wall-to-wall carpeting is maroon.

(iii) None of the offices on the 8th floor has maroon wall-to-wall carpeting.

If the first two statements are **true**, the third statement is :

(A) true

(B) false

(C) uncertain

(D) none

34. The first underground railway in India was opened in 1984 in _____.

(A) Mumbai

(B) Chennai

(C) Kolkata

(D) Bangalore

35. (i) During the past year, Jim saw more movies than Sam.

(ii) Sam saw fewer movies than Dan.

(iii) Dan saw more movies than Jim.

If the first two statements are **true**, the third statement is :

(A) true

(B) false

(C) uncertain

(D) none

36. _____ was the first planet in the solar system to be visited by a Spacecraft.

(A) Mercury

(B) Venus

(C) Mars

(D) Jupiter

37. Greto Garbo is a name associated with :

(A) Journalism

(B) Literature

(C) Acting

(D) Classical dance

38. Khardung La mountain pass is located in _____.

(A) Himachal Pradesh

(B) Uttarakhand

(C) Jammu and Kashmir

(D) Sikkim

39. Which of the following statements is **false** ?

(A) Rice is a commercial crop in Odisha.

(B) Coffee is an important plantation crop in Karnataka.

(C) Groundnut is a major Kharif crop in Gujarat.

(D) Meghalaya is a major pineapple producing states of India.

40. _____ defined democracy as a "Government of the people, by the people and for the people".

(A) Abraham Lincoln

(B) Plato

(C) Aristotle

(D) Ruskin

41. In a certain code language, lew yas iuna cejo means she is eating apples; lew tepo qua means she sells toys and sul lim cejo means I like apples. Which word in that language means she and apples ?

(A) yas & cejo

(B) yas & lew

(C) lew & cejo

(D) lew & yas

42. India shares land borders with _____ countries.

(A) Six

(B) Seven

(C) Eight

(D) Nine

43. The movie Jurassic Park was a super-hit in the 90s. The movie shows scientists creating live dinosaurs by replicating dinosaur DNA found inside an insect that had bitten dinosaur centuries back and was then trapped in amber. Though such a feat has not been accomplished in the real world, yet one day modern science will possibly succeed in recreating prehistoric creatures in a similar manner.

All of the following assumptions underlie the conclusion of the passage above EXCEPT :

(A) the genetic information in DNA is sufficient to permit the recreation of an entire animal.

(B) it will someday be possible to accurately replicate DNA in a laboratory.

(C) enough DNA can be extracted from an insect to recreate an entire animal.

(D) scientists will never fully understand how DNA functions.

44. _____ has been recently named as the world's biggest private equity firm.

(A) Aditya Birla Group

(B) Blackstone Group

(C) Goldman Sachs

(D) General Atlantic

45. Which expert committee has constituted by the NITI Aayog to provide a major thrust to job creation by enhancing India's exports ?

(A) Raghav Yadav

(B) Milind Kumar

(C) S.K. Jain

(D) Rajiv Kumar

46. Deepika had four papers in her matriculation exam – English, Hindi, Social Studies and Science – each carrying a maximum of 100 marks. Her uncle offered her a Paulo Coelho book as a present if she got 60% or more in both English and Social Studies, provided she got an aggregate of at least 200. He also offered her a Harry Potter book as a present if she got 60% or more in both Hindi and Social Studies provided she got an aggregate of at least 200 (Deepika was eligible for both the presents). As it turned out, Deepika got the Paulo Coelho book but not the Harry Potter book. If she scored 64 in both English and Social Studies, the minimum that she got in Science was.

(A) 36 (B) 56

(C) 22 (D) 13

47. If 10, 12 and 'x' are sides of an acute angled triangle, how many integer values of 'x' are possible ?

(A) 7 (B) 12

(C) 9 (D) 13

48. Mahira and Neelima started walking towards each other, simultaneously from Gandhi Nagar and Nehru Nagar respectively, which are 72 miles apart. They met after 6 hours. After their meeting, Mahira reduced her speed by 1 mile/h and Neelima increased by 1 mile/h. They arrived at Nehru Nagar and Gandhi Nagar respectively at the same time. Find their initial speeds :

(A) 6.5 miles/h and 7.5 miles/h

(B) 6 miles/h and 7 miles/h

(C) 6.5 miles/h and 5.5 miles/h

(D) 15.5 miles/h and 9 miles/h

49. Arun and Barun are both athletes. However, Arun runs 25% faster than Barun. He is able to allow Barun a lead of 7 meters to end a race in scorching heat. What is the length of the race ?

(A) 10 meters

(B) 25 meters

(C) 15 meters

(D) 35 meters

50. If I sell a computer at 80% of its marked price, I make a loss of 12%. What % profit will I make if the computer is sold at 95% of its marked price ?

(A) 5% profit

(B) 1% loss

(C) 5.5% profit

(D) 4.5% profit

51. For what values of 'k' will the pair of equations $3x+4y=12$ and $kx+12y=30$ NOT have a unique solution ?

(A) 9 (B) 12

(C) 3 (D) 7.5

52. If "x" is an integer, which of the following inequalities have a finite range of values of "x" satisfying them ?

(A) $x^2+5x+6 > 0$

(B) $|x+2| > 4$

(C) $9x-7 < 3x+14$

(D) $x^2-4x+3 < 0$

53. The length of a rope, to which a cow is tied, is increased from 19 m to 30 m. How much additional ground will it be able to graze ? Assume that the cow is able to move on all sides with equal ease. Use $\pi = 22/7$ in your calculations.

(A) 1696 sq m

(B) 1694 sq m

(C) 1594 sq m

(D) 1756 sq m

54. There is a class of 120 students in St. Paul's College. All the students are numbered 1 to 120, where in all even numbered students opt for History, those numbers are divisible by 5 opt for Geography and those whose numbers are divisible by 7 opt for Political Science. How many opt for none of the three subjects ?

(A) 19 (B) 41

(C) 21 (D) 57

55. We have analyzed the monthly salaries received by 5 employees : The mean and median of the salaries is $7000. The only mode among the observations is $12,000. Salaries paid to each employee were in full thousands. What is the difference between the highest and the lowest salary received by the 5 employees in the month ?

(A) $4000

(B) $13,000

(C) $5000

(D) $11,000

56. The government recently started a special train to connect the remote areas with the main cities. The basic one-way fare for a child between 3 and 10 years costs half the regular fare for an adult plus a reservation charge that is the same on the child's ticket as on the adult's ticket. One reserved ticket for an adult costs $216 and the cost of a reserved ticket for an adult and a child (aged between 3 and 10) costs $327. What is the basic fare for the journey for an adult ?

(A) $111 (B) $52.5

(C) $210 (D) $58.5

57. In a big farm in Wisconsin, there are only hens and cows. When the owner counted the heads of the stock in the farm, the number summed up to 200, while counting the number of legs, the number summed up to 540. How many more hens were there in the farm ? Assume each cow had 4 legs and each hen had 2 legs.

(A) 70 (B) 120

(C) 60 (D) 130

58. 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) 5 (B) 21

(C) 33 (D) 60

59. What is the measure of the radius of the circle that circumscribes a triangle whose sides measure 9, 40 and 41 ?

(A) 6 (B) 4

(C) 24.5 (D) 20.5

60. A task can be completed in 20 days, if Rose and Ryan work together. However, if Rose worked alone and completed half the task and then Ryan takes over and completes the second half, the task will be completed in 45 days. How long will Rose take to complete the task if she worked alone ? Assume that Ryan is more efficient than Rose.

(A) 25 days

(B) 30 days

(C) 60 days

(D) 65 days

SECTION - B

61. Which of the following statements are **not** correct ?

S1 : 3NF decomposition is always lossless join and dependency preserving.

S2 : 3NF decomposition is always lossless join but may or may not be dependency preserving.

S3 : BCNF decomposition always lossless join and dependency preserving.

S4 : BCNF decomposition is always lossless join but may or may not be dependency preserving.

(A) Only S1

(B) Only S4

(C) Both S1 and S4

(D) Both S2 and S3

62. According to the given language, which among the following expressions does it corresponds to ?

Language $L = \{x \epsilon \{0,1\} | x$ is of length 4 or less$\}$.

(A) $(0+1+0+1+0+1+0+1)^4$

(B) $(0+1)^4$

(C) $(01)^4$

(D) $(0+1+\varepsilon)^4$

63. Using bisection method, one root of $X^4 - X - 1$ lies between 1 and 2. After second iteration the root may lie in interval :

(A) (1.25, 1.5)

(B) (1, 1.25)

(C) (1, 1.5)

(D) None of the options

64. In a cache memory if total number of sets are 's', then the set offset is :

(A) 2^8 (B) $\log_2 s$

(C) s^2 (D) s

65. Which of the following is machine independent optimization ?

(A) Loop optimization

(B) Redundancy Elimination

(C) Folding

(D) All of the options

66. A stack organized computer has which of the following instructions ?

(A) zero-address

(B) one-address

(C) two-address

(D) three-address

67. Let G be a grammar in CFG and let W_1, $W_2 \epsilon$ L(G) such that $|W_1| = |W_2|$ then which of the following statement is **true** ?

(A) Any derivation of W_1 has exactly the same number of steps as any derivation of W_2

(B) Different derivation have different length.

(C) Some derivation of W_1 may be shorter the derivation of W_2

(D) None of the options

68. Let A be an array of 31 numbers consisting of a sequence of 0's followed by a sequence of 1's. The problem is to find the smallest index i such that A[i] is 1 by probing the minimum number of locations in A. The worst case number of probes performed by an optimal algorithm is :

(A) 2 (B) 4

(C) 3 (D) 5

69. Find the smallest number y such that $y \times 162$ (y multiplied by 162) is a perfect cube :

(A) 24 (B) 27

(C) 36 (D) 38

70. A regular expression is (a + b*c) is equivalent to :

(A) set of strings with either a or one or more occurrence of b followed by c.

(B) (b*c + a)

(C) set of strings with either a or zero or more occurrence of b followed by c.

(D) Both (B) and (C)

71. Which of the following are undecidable ?

P1 : The language generated by some CFG contains any words of length less than some given number n.

P2 : Let L1 be CFL and L2 be regular, to determine whether L1 and L2 have common elements

P3 : Any given CFG is ambiguous or not.

P4 : For any given CFG G, to determine whether epsilon belongs to L(G).

(A) P2 only

(B) P1 and P2 only

(C) P2 and P3 only

(D) P3 only

72. Consider the following four processes with their corresponding arrival time and burst time :

Process	Arrival time	Burst time (in ms)
P1	0.0	8
P2	0.6	6
P3	3.8	4
P4	4.4	2

What is the average turnaround time (in ms) for these processes using FCFS scheduling algorithm ?

(A) 15

(B) 12.8

(C) 13

(D) none of the options

73. Consider a non-pipelined machine with 6 stages; the lengths of each stage are 20ns, 10ns, 30ns, 25ns, 40ns, and 15ns respectively. Suppose for implementing the pipelining the machine adds 5ns of overhead to each stage for clock skew and set up. What is the speed up factor of the pipelining system (ignoring any hazard impact) ?

(A) 7 (B) 14

(C) 3.11 (D) 6.22

74. We have 10-stage pipeline, where the branch target conditions are resolved at stage 5. How may stalls are there for an incorrectly predicted branch ?

(A) 5 (B) 6

(C) 7 (D) 4

75. In how many ways 8 girls and 8 boys can sit around a circular table so that no two boys sit together ?

(A) $(7!)^2$ (B) $(8!)^2$

(C) 7! 8! (D) 15!

76. Which of the following is added to the page table in order to track whether a page of cache has been modified since it was read from the memory ?

(A) Reference bit (B) Dirty bit

(C) Tag bit (D) Valid bit

77. The time taken to switch between user and kernel modes of execution be t1 while the time taken to switch between two processes be t2. Which of the following is **TRUE** ?

(A) t1 > t2

(B) t1 = t2

(C) t1 < t2

(D) nothing can be said about the relation between t1 and t2

78. In conservative two phase locking protocol, a transaction :

(A) Should release all the locks only at beginning of transaction

(B) Should release exclusive locks only after the commit operation

(C) Should acquire all the exclusive locks at beginning of transaction

(D) Should acquire all the locks at beginning of transaction

79. Recursive enumerable languages are not closed under _____.

(A) Set difference

(B) Complement

(C) Both (A) and (B)

(D) None of the options

80. Let u and v be two vectors in R^2 whose Euclidean norms satisfy $|u| = 2|v|$. What is the value α such that $w = u + \alpha v$ bisects the angle between u and v ?

(A) 2 (B) 1

(C) $\frac{1}{2}$ (D) -2

81. A system has 3 processes sharing 4 resources. If each process needs a maximum of 2 units then, deadlock.

(A) Can never occur

(B) Has to occur

(C) May occur

(D) None of the options

82. What is the meaning of regular expression Σ^* 001 Σ^* ?

(A) Any string containing '1' as substring

(B) Any string containing '01' as substring

(C) Any string containing '011' as substring

(D) All string containing '001' as substring

83. Let G be a complete undirected graph on 8 vertices. If vertices of G are labelled, then the number of distinct cycles of length 5 in G is equal to :

(A) 15 (B) 30

(C) 56 (D) 60

84. Which of the following is TRUE ?

(A) Every relation in 3NF is also in BCNF

(B) A relation R is in 3NF if every non-prime attribute of R is fully functionally dependent on every key of R

(C) Every relation in BCNF is also in 3NF

(D) No relation can be in both BCNF and 3NF

85. Consider the relational schema R(A B C D) with following FD set $F = \{A \rightarrow CE, B \rightarrow D, AE \rightarrow D\}$, Identify the highest normal form satisfied by the relation R.

(A) 2NF (B) BCNF

(C) 3NF (D) 1NF

86. The grammar $S \rightarrow aSb \mid bSa \mid SS \mid \epsilon$ is :

(A) Unambiguous CFG

(B) Ambiguous CFG

(C) Not a CFG

(D) Deterministic CFG

87. If any string of a language L can be effectively enumerated by an enumerator in a lexicographic order then language L is _____.

(A) Regular

(B) Context free but not necessarily regular

(C) Recursive but not necessarily context free

(D) Recursively enumerable but not necessarily recursive

88. A RAM chip has 7 address lines, 8 data lines and 2 chips select lines. Then the number of memory locations is _____.

(A) 2^{12} (B) 2^{10}

(C) 2^{19} (D) 2^{13}

89. Which of the following is not a deliverable of the structured system analysis ?

(A) Data flow diagram

(B) Prototype model

(C) Entity Relationship diagram

(D) Data dictionary

90. If for a given Binary Search Tree (BST) the pre-order traversal is 41, 23, 11, 31, 62, 50, 73. Then which of the following is its post-order traversal ?

(A) 11, 31, 23, 50, 73, 62, 41

(B) 31, 11, 23, 50, 41, 62, 73

(C) 11, 31, 50, 23, 73, 62, 41

(D) 11, 31, 23, 50, 62, 73, 41

91. Consider a complete binary tree where the left and the right sub trees of the root are max-heaps. The lower bound for the number of operations to convert the tree to a heap is :

(A) Ω (logn) (B) Ω (nlogn)

(C) Ω (n) (D) Ω (n^2)

SPACE FOR ROUGH WORK

92. The collection of Turing recognizable languages are closed under :

(i) Union

(ii) Intersection

(iii) Complement

(iv) Concatenation

(v) Star closure

(A) (i) Only

(B) Both (i), (iv)

(C) (i), (ii), (iv) and (v)

(D) All of the options

93. Which of the following statements is / are **false** ?

S1 : LR(0) grammar and SLR(1) grammar are equivalent

S2 : LR(1) grammar are subset of LALR(1) grammars

(A) S1 only

(B) S1 and S2 both

(C) S2 only

(D) None of the options

94. The condition for total participation of entity in a relationship is _____.

(A) Maximum cardinality should be one

(B) Minimum cardinality should be one

(C) Minimum cardinality should be zero

(D) None of the options

95. Which of the following regular expression is equal to $(r_1 + r_2)^*$?

(A) $r_1^* r_2^*$ (B) $(r_1 r_2)^*$

(C) $r_1^* r_2^* + r_1 r_2$ (D) $(r_1^* r_2^*)^*$

96. If the number of networks and number of hosts in class B are 2^m, $(2^n - 2)$ respectively. Then the relation between m, n is :

(A) $3m = 2n$ (B) $7m = 8n$

(C) $8m = 7n$ (D) $2m = 3n$

97. Which of the following statement is **true** ?

S1: The power of a multi-tape Turing machine is greater than the power of a single tape Turing machine

S2: Every non-deterministic Turing machine has an equivalent deterministic Turing machine

(A) S1

(B) S2

(C) Both S1 and S2

(D) None of the options

98. Which of the following is **false** ?

(A) The smallest and fastest computer imitating brain working is called quantum computer

(B) A computer with a speed of around 100 million instructions per second with the word length of around 64 bits is known as super computer

(C) The term Exa-byte = 1024 Tera Bytes

(D) None of the options

99. Which of the following is **true** ?

(A) Melay and Moore machine are language acceptors.

(B) Finite State automata is language translator.

(C) NPDA is more powerful than DPDA.

(D) Melay machine is more powerful than Moore machine.

100. Which of the following is/are **not** features of RISC processor ?

(i) Large number of addressing modes

(ii) Uniform instruction set

(A) (i) Only

(B) (ii) Only

(C) Both (i) and (ii)

(D) None of the options

101. Which of the following is equivalent regular expressions ?

(i) $((01)^*(10)^*)^*$

(ii) $(10+01)^*$

(iii) $(01)^* + (11)^*$

(iv) $(0^* + (11)^* + 0^*)^*$

(A) (i) and (ii) (B) (ii) and (iii)

(C) (iii) and (iv) (D) (iv) and (i)

102. The optimization phase in a compiler generally :

(A) Reduces the space of the code

(B) Optimizes the code to reduce execution time

(C) Both (A) and (B)

(D) Neither (A) nor (B)

103. Which one is the correct translation of the following statement into mathematical logic ?

"None of my friends are perfect."

(A) $\neg \exists x\,(p(x) \wedge q(x))$

(B) $\exists x\,(\neg p(x) \wedge q(x))$

(C) $\exists x\,(\neg p(x) \wedge \neg q(x))$

(D) $\exists x\,(p(x) \wedge \neg q(x))$

104. If x is a one dimensional array, then :

(A) $*(x+i)$ is same as $*(\&x[i])$

(B) $\&x[i]$ is same as $x+i-1$

(C) $*(x+i)$ is same as $*x[i]$

(D) $*(x+i)$ is same as $*x+i$

105. The string 1101 does not belong to the set represented by :

(A) $(00+(11)^*0)$

(B) $1(0+1)^*101$

(C) $(10)^*(01)^*(00+11)^*$

(D) $110^*(0+1)$

106. The number of integers between 1 and 500 (both inclusive) that are divisible by 3 or 5 or 7 is _____.

(A) 269 (B) 270

(C) 271 (D) 272

107. INCA (Increase register A by 1) is an example of which of the following addressing mode ?

(A) Immediate addressing

(B) Indirect addressing

(C) Implied addressing

(D) Relative addressing

108. On a set A = {a, b, c, d} a binary operation * is defined as given in the following table.

*	a b c d
a	a c b d
b	c b d a
c	b d a c
d	d a c b

The relation is :

(A) Commutative but not associative

(B) Neither commutative nor associative

(C) Both commutative and associative

(D) Associative but not commutative

109. Which of the following is **false** ?

(A) Interrupts which are initiated by an instruction are software interrupts

(B) When a subroutine is called, the address of the instruction following the CALL instruction is stored in the stack pointer

(C) A micro program which is written as 0's and 1's is a binary micro program

(D) None of the options

110. Let n is the length of string to test for membership, then the number of table entry in CYK algorithm is :

(A) $n(n+1)$

(B) n^2+1

(C) n^2-1

(D) $n(n+1)/2$

111. The total number of page faults for the reference string 1, 2, 3, 4, 5, 6, 7, 8, 9, 10 using FIFO page replacement policy for a process, if 3 frames are allocated to it are :

(A) 9 (B) 10

(C) 8 (D) 11

112. Let G be a simple undirected graph on $n=3x$ vertices ($x >= 1$) with chromatic number 3, then maximum number of edges in G is :

(A) $n(n-1)/2$ (B) n^{n-2}

(C) nx (D) n

113. When the sum of all possible two digit numbers formed from three different one digit natural numbers are divided by sum of the original three numbers, the result is :

(A) 26 (B) 24

(C) 20 (D) 22

114. Which of the following statement is/are true in the context of interpreters ?

S1 : Interpreters process program according to the logical flow of control through the program.

S2 : Interpreter translates and executes the error-free first instruction before it goes to the second.

S3 : Interpreter processing time is less compared with compiler.

S4 : LISP and Prolog are interpreted languages.

(A) Only S1

(B) Only S3

(C) Only S1, S2 and S3

(D) Only S1, S2 and S4

115. Consider the relational schema R(A B C D) with following functional dependency set F = {A→BC, C→D}; The relation R is in _____.

(A) 2NF (B) BCNF

(C) 3NF (D) 1NF

116. Which of the following statement is **true** ?

(A) Deterministic context free language are closed under complement.

(B) Deterministic context free language are not closed under Union.

(C) Deterministic context free language are closed under intersection with regular set.

(D) All of the options

117. Which machine is equally powerful in both deterministic and non-deterministic form ?

(A) Push Down Automata

(B) Turing machine

(C) Linear Bounded Automata

(D) None of the options

118. Which of the following is a correct hierarchical relationships of the following where

L_1 : set of languages accepted by NFA

L_2 : set of languages accepted by DFA

L_3 : set of languages accepted by DPDA

L_4 : set of languages accepted by NPDA

L_5 : set of recursive language

L_6 : set of recursive enumerable languages ?

(A) $L_1, L_2 \subset L_3 \subset L_4 \subset L_5 \subset L_6$

(B) $L_1 \subset L_2 \subset L_3 \subset L_4 \subset L_5 \subset L_6$

(C) $L_2 \subset L_1 \subset L_3 \subset L_4 \subset L_5 \subset L_6$

(D) $L_1 \subset L_2 \subset L_3 \subset L_4 \subset L_6 \subset L_5$

119. A two-word instruction is stored in a location A. The operand part of instruction holds B. If the addressing mode is relative, the operand is available in location :

(A) A + B + 2 (B) A + B + 1

(C) B + 1 (D) A + B

120. Consider two matrices M_1 and M_2 with $M_1 * M_2 = 0$ and M_1 is non singular. Then which of the following is true ?

(A) M_2 is non singular

(B) M_2 is null matrix

(C) M_2 is the identity matrix

(D) M_2 is transpose of M_1

- o 0 o -