



उम्मीदवार इस पुस्तिका के सबसे ऊपरी सील को खोलकर पृष्ठ संख्या 2 और 3 के मध्य स्थापित OMR उत्तर शीट 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. :  
Booklet No. :

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

**SA-CS**

परीक्षा प्रश्न-पुस्तिका / EXAMINATION QUESTION BOOKLET

निर्धारित समय : 180 मिनट  
Time Allowed : 180 Minutes

**COMPUTER SCIENCE**

अधिकतम अंक : 120  
Maximum Marks : 120

रोल नं.   
Roll No. :

उत्तर शीट सं. :   
Answer Sheet No. :

प्रश्नों के उत्तर देने से पहले निम्नलिखित अनुदेशों को ध्यान से पढ़ लें। / Read the following instructions carefully before you begin to answer the questions.

उम्मीदवारों के लिए अनुदेश	Instructions to the Candidates
<p>1. प्रश्नों के उत्तर लिखना आरंभ करने से पहले आप इस पुस्तिका की जाँच करके सुनिश्चित कर लें कि इसमें पूरे पृष्ठ (1-16) 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 और जो उनके Admit Card में छपा है अर्थात् कंप्यूटर साइंस या सूचना प्रौद्योगिकी या इलेक्ट्रॉनिक्स। यदि आप इस पुस्तिका में कोई त्रुटि पाएँ, तो तत्काल इसके बदले दूसरी पुस्तिका ले।</p> <p>2. ओएमआर उत्तर-शीट प्रश्न पुस्तिका में ही उपलब्ध रहेगी। कृपया सुनिश्चित करें कि ओएमआर शीट संख्या और परीक्षा पुस्तिका संख्या समान हैं। ओएमआर शीट पर जानकारी भरने से पहले ओएमआर शीट पर छपे निर्देशों को ध्यान से पढ़ें। आपको ओएमआर उत्तर-पत्रक पर सभी विवरणों को सही ढंग से पूरा और कोड करना होगा, ऐसा न करने पर आपकी उत्तर पुस्तिका का मूल्यांकन नहीं किया जा सकता है। प्रश्नों का उत्तर देना शुरू करने से पहले आपको ओएमआर उत्तर-पत्रक पर दिये गए निर्धारित स्थान पर अपने हस्ताक्षर करने होंगे। इन निर्देशों का पूर्ण रूप से पालन किया जाना चाहिए, ऐसा न करने पर आपकी ओएमआर उत्तर-पुस्तिका का मूल्यांकन नहीं किया जा सकता है। (दृष्टिहीन उम्मीदवारों के लिए यह विवरण लेखक द्वारा भरे जायेंगे। फिर भी, सभी दृष्टिहीन उम्मीदवारों को ओएमआर उत्तर-शीट में निर्धारित स्थान पर अपने बाएँ 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।)</p> <p>3. ओएमआर उत्तर-शीट तीन प्रतियों में होंगी (मूल तथा कार्बन की दो प्रतिलिपियाँ)। परीक्षा समाप्ति के बाद ओ.एम.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 उसकी उम्मीदवारी रद्द कर दी जायेगी। यदि कोई उम्मीदवार 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।</p> <p>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।</p> <p>5. 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।</p> <p>6. प्रत्येक सही उत्तर के लिए 1 अंक दिया जाएगा और प्रत्येक गलत उत्तर के लिए 0.25 अंक काट लिया जाएगा।</p> <p>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।</p> <p>8. किसी भी स्थिति में उत्तर शीट को न मोड़ें।</p> <p>9. उत्तर-पुस्तिका पर कोई भी रफ कार्य नहीं करना है। रफ कार्य के लिए इस पुस्तिका में स्थान दिया गया है।</p> <p>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 ऑफ़ 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।</p> <p>11. अभ्यर्थी अपनी उत्तर पुस्तिका पर्यवेक्षक को सौंपे बिना और अपने रोल नंबर के सामने उचित स्थान पर उपस्थिति पत्रक पर हस्ताक्षर किए बिना परीक्षा हॉल/कक्ष से बाहर नहीं जा सकता। इसके अलावा अभ्यर्थी को उपस्थिति पत्रक पर हस्ताक्षर करने से पहले यह भी सुनिश्चित करना चाहिए कि बुकलेट नंबर, बुकलेट सीरीज और ओएमआर उत्तर पुस्तिका संख्या सही ढंग से लिखी गई हो। ऐसा ना करने पर, ओएमआर उत्तर पुस्तिका को अमान्य माना जाएगा/मूल्यांकन नहीं किया जा सकता है।</p>	<p>1. Before you start to answer the questions you must check this booklet and ensure that it contains all the pages (1-16) 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 strictly from the stream candidate has applied for and printed on the Admit Card i.e. Computer Science OR Information Technology OR Electronics. If you find any defect in this Booklet, you must get it replaced <b>immediately</b>.</p> <p>2. OMR Answer-Sheet is within the Question Booklet. Please ensure OMR Answer-Sheet number and Test Booklet No. of Question Paper are same. Read the instructions printed on OMR Answer-Sheet carefully before filling the information on the OMR Answer-Sheet. You must complete and code all the details on the OMR answer sheet correctly failing which your answer sheet may not be evaluated. 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 may 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.)</p> <p>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.</p> <p>4. This 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.</p> <p>5. Question Booklet consists of two parts : Part A : Generic (having 42 questions) and Part B : Technical (having 78 questions). Candidates has to attempt both parts compulsorily.</p> <p>6. For each correct answer One mark will be given and for each incorrect answer 0.25 marks will be deducted.</p> <p>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.</p> <p>8. Do not fold answer sheet in any case.</p> <p>9. No rough work is to be done on the Answer-Sheet. Space for rough work has been provided in this booklet.</p> <p>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.</p> <p>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 at proper place against your roll number, further candidate should also ensure that booklet no., booklet series and OMR Answer-Sheet No. are correctly written on attendance sheet before signing on it, failing in doing so, may lead to disqualification / no evaluation of OMR Answer-Sheet.</p>

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.

उम्मीदवार का नाम/Name of Candidate :

उम्मीदवार के हस्ताक्षर/Signature of Candidate :



**PART - A**  
**GENERIC**

**Direction (1-3) :** Read the following information carefully and answer question number 1-3 given below :

In an engineering college, four students Diksha, Shreya, Tanvi and Akriti exhibit a very strange mix of hobbies and subject interests. One of them studies Computer Science and plays Golf and Lawn Tennis. Diksha and Shreya study Mechanical engineering. Diksha plays Billiards. Both the Mechanical Engineering students play chess. Tanvi is a student of Physics. The Physics student plays Chess and Badminton. All the friends play two games each and study one subject each. One of the students also does weight training.

1. Who studies Mechanical Engineering and plays Billiards ?  
(A) Diksha                      (B) Shreya  
(C) Tanvi                        (D) Akriti
2. How many games are played and subjects studied by all the four students ?  
(A) 2, 1                        (B) 3, 2  
(C) 6, 3                        (D) 5, 4
3. Who does not play Chess ?  
(A) Diksha                      (B) Shreya  
(C) Tanvi                        (D) Akriti
4. In a certain code language, '493' means 'Friendship Big Challenge', '961' means 'Struggle Big Exam' and '178' means 'Exam Confidential Subject'. What does 'Confidential' stand for ?  
(A) 7 or 8                      (B) 7 or 9  
(C) 8                              (D) 8 or 1

5. The day before the day before yesterday is three days after Saturday. What day is it today ?  
(A) Tuesday                      (B) Wednesday  
(C) Thursday                      (D) Friday
6. John's house is 100 m North of his uncle's office. His uncle's house is located 200 m West of his (uncle's) office. Kabir is the friend of John and he stays 100 m East of John's house. The office of Kabir is located 100 m South of his house. Then, how far is his uncle's house from Kabir's office ?  
(A) 200 m                      (B) 300 m  
(C) 400 m                      (D) 500 m

**Direction (7-8) :** What value should come in place of the question mark (?) in the series given below ?

7. BEAG, DGCI, FIEK, ? .  
(A) HMIE                      (B) HKGM  
(C) HGKJ                      (D) HKLJ
8. 128, 61, Y, 64, 63, S, 32, 65, N, 16, 67, J, 8, 69, G, ?, ?, ? :  
(A) 2, 70, J                      (B) 3, 70, E  
(C) 4, 70, E                      (D) 4, 71, E

**Direction (9-13) :** Read the information given below and on the basis of the information, select the correct alternative for each question (9-13) given after the information.

A training college has to conduct a refresher course for teachers of seven different subjects - Mechanics, Psychology, Philosophy, Sociology, Economics, Science and Engineering from November 22 to November 29.

- (i) Course should start with Psychology.
  - (ii) November 23, being Sunday, should be a holiday.
  - (iii) Science subject should be on the previous day of the Engineering subject.
  - (iv) Course should end with Mechanics subject.
  - (v) Philosophy should be immediately after holiday.
  - (vi) There should be a gap of one day between Economics and Engineering.
  - (vii) There should be a gap of two days between Sociology and Economics.
9. How many days' gap is there between Science and Philosophy ?
- (A) 1                                      (B) 2  
(C) 3                                      (D) No gap
10. Which subject will be on Tuesday ?
- (A) Psychology                      (B) Mechanics  
(C) Economics                      (D) Sociology
11. Which subject precedes Mechanics ?
- (A) Psychology                      (B) Mechanics  
(C) Economics                      (D) Sociology

12. Which subject succeeds Science ?
- (A) Psychology                      (B) Mechanics  
(C) Engineering                      (D) Sociology
13. The refresher course will start with which one of the following subjects ?
- (A) Psychology                      (B) Mechanics  
(C) Economics                      (D) Sociology

**Direction (14-18) :** Read the information given below and on the basis of the information, select the correct alternative for each question (14-18) given after the information.

There are six women, Shalini, Divya, Ritu, Rashmi, Nisha and Renu in a family of 12 members. There are few married couples in the family and none of the grand children are married. Sunil is married into the family. Rohan, Mahesh and Jatin have a nephew Dipesh who is the son of Rashmi. Ravi is the paternal grandfather of Nisha. Ritu is the daughter-in-law of Shalini. Renu is the first cousin of Dipesh. Shalini has only three grand children. Mahesh has two brothers and only one sister Rashmi and a sister-in-law Divya. Dipesh's only unmarried maternal uncle Jatin is the brother-in-law of Sunil. Rohan is the paternal uncle of Nisha. Ritu has two daughters one of whom is Nisha.

14. Which of the following is true ?
- (A) Dipesh is Mahesh's son.  
(B) Ravi has only two married children.  
(C) Ravi is the paternal grandfather of Renu.  
(D) None of these.
15. Rashmi is \_\_\_\_\_.
- (A) Mahesh's wife  
(B) Renu's aunt  
(C) Nisha's Mother  
(D) None of these

16. Dipesh is \_\_\_\_\_.
- (A) Mahesh's son  
 (B) Ravi's grand son  
 (C) Rohan's son  
 (D) Sunil's nephew
17. Which one of the following is a married couple ?
- (A) Rohan and Ritu  
 (B) Shalini and Mahesh  
 (C) Renu and Sunil  
 (D) Mahesh and Ritu
18. How many married couples are there in the second generation ?
- (A) 1                      (B) 2  
 (C) 3                      (D) 4

**Direction (19-21) :** Read the information given below and on the basis of the information, select the correct alternative for each question (19-21) given after the information.

- (i) Eleven students A, B, C, D, E, F, G, H, I, J and K are sitting in a row of the class facing the teacher.
- (ii) D, who is to the immediate left to F, is second to the right of C.
- (iii) A, is the second to the right of E, who is at one of the ends.
- (iv) J is the immediate neighbor of A and B and third to the left of G.
- (v) H is to the immediate left of D and third to the right of I.
19. Who is sitting in the middle of the row ?
- (A) C                      (B) I  
 (C) B                      (D) G

20. Which of the following groups of friends is sitting to the right of G ?
- (A) IBJA                      (B) ICHDF  
 (C) CHDF                      (D) CHDE
21. Which of the following statements is true in the context of the above sitting arrangement ?
- (A) There are three students sitting between D and G.  
 (B) G and C are neighbors sitting to immediate right of H.  
 (C) B is sitting between J and I.  
 (D) K is sitting between A and G.
22. The length, breadth and height of a cuboid are in the ratio 3 : 4 : 5 and its volume is  $3840 \text{ cm}^3$ , The smallest side has a length of :
- (A) 12 cm                      (B) 20 cm  
 (C) 15 cm                      (D) 18 cm
23. The length, breadth and height of a room are in the ratio of 3 : 2 : 1. If its volume be  $1296 \text{ m}^3$ , find its breadth.
- (A) 12 m                      (B) 18 m  
 (C) 16 m                      (D) 24 m
24. The LCM of two numbers is 45 times their HCF. One number is 125 and the sum of their HCF and LCM is 1150. Find the other number.
- (A) 275                      (B) 215  
 (C) 230                      (D) 225

25. The untimely loss of life is a cause of serious global concern as thousands of people get killed \_\_\_\_\_ accidents every year while many other die \_\_\_\_\_ diseases like cardio vascular disease, cancer, etc.  
 (A) in, of (B) from, of  
 (C) during, from (D) from, from
26. If the numerator of a fraction is increased by 2 and the denominator is decreased by 1, then it becomes  $\frac{2}{3}$ . If the numerator is increased by 1 and the denominator is increased by 2, then it becomes  $\frac{1}{3}$ . Find the fraction.  
 (A)  $\frac{2}{9}$  (B)  $\frac{2}{7}$   
 (C)  $\frac{1}{6}$  (D)  $\frac{1}{5}$
27. An aeroplane at an altitude of 3000 m observes the angles of depression of opposite points on the two banks of a river to be  $45^\circ$  and  $60^\circ$  respectively. Find the width of the river in metre.  
 (A) 4730 (B) 4430  
 (C) 4150 (D) 4650
28. Which of the following is true ?  
 (A)  $\log_{17} 275 = \log_{19} 375$   
 (B)  $\log_{17} 275 > \log_{19} 375$   
 (C)  $\log_{17} 275 < \log_{19} 375$   
 (D) None of these
29. In a company ABC Ltd. a certain number of engineers can develop a design in 40 days. If there were 5 more engineers, it could be finished in 10 days less. How many engineers were there in the beginning ?  
 (A) 18 (B) 20  
 (C) 25 (D) 15
30. Choose the most appropriate word from the options given below to complete the following sentence: He is \_\_\_\_\_ speaker, his discourses are always informative and inspirational.  
 (A) an eloquent  
 (B) an amateur  
 (C) a novice  
 (D) an inarticulate
31. Find the missing number :
- |    |   |
|----|---|
| 15 | 2 |
| 80 |   |
| 5  | 6 |
- |    |   |
|----|---|
| 12 | 4 |
| 54 |   |
| 6  | 5 |
- |    |   |
|----|---|
| 18 | 3 |
| ?  |   |
| 7  | 2 |
- (A) 46 (B) 15  
 (C) 55 (D) 32
32. How many eight letter words can be formed from the letters of the word "COURTESY" beginning with C and ending with Y ?  
 (A) 120 (B) 256  
 (C) 720 (D) 750
33. Find the wrong term in the series 5, 11, 29, 83, 245, 765, 2189, 6563 :  
 (A) 245 (B) 765  
 (C) 2189 (D) 6563
34. Out of 13 applicants for a job there are 5 women and 8 men. Two persons are to be selected for the job. Find the probability that at least one of the selected persons will be a women.  
 (A)  $\frac{25}{39}$  (B)  $\frac{10}{21}$   
 (C)  $\frac{14}{27}$  (D)  $\frac{12}{51}$

35. Abha can do some work in 10 days, Billu can do it in 20 days and Chintu can do it in 40 days. They start working in turns with Abha starting to work on the first day followed by Billu on the second day and by Chintu on the third day and again by Abha on the fourth day and so on, till the work is completed fully. Find the time taken (approx.) to complete the work fully.
- (A) 16 days (B) 15 days  
(C) 17 days (D) 20 days
36. "The judge's standing in the legal community, though shaken by false allegations of wrongdoing, remained \_\_\_\_\_." The word that best fills the blank in the above sentence is :
- (A) undiminished (B) damaged  
(C) illegal (D) uncertain
37.  $\log(x+3) + \log(x+5) = \log 35$ , solve for  $x$  :
- (A) 1 (B) 2  
(C) 3 (D) 4
38. First bag contains 5 white and 4 black balls. Second bag contains 7 white and 9 black balls. A ball is transferred from the first bag to the second bag and then a ball is drawn from the second bag. Find the probability that the ball drawn is white.
- (A)  $7/18$  (B)  $5/9$   
(C)  $4/9$  (D)  $11/18$
39. A certain sum of money amounts to ₹ 6600 in 4 years at a certain rate percent simple interest. If the rate of interest be increased by its 25%, the same sum would amount to ₹ 7000 during the same period. Find the sum.
- (A) ₹ 6000 (B) ₹ 5500  
(C) ₹ 5000 (D) ₹ 7000
40. Given below question has an idiomatic expression followed by four options. Choose the one closest to its meaning :  
"To smell a rat"
- (A) science of plague epidemic  
(B) bad smell  
(C) suspect foul dealings  
(D) to be in a bad mood
- Direction (41-42) :** The question below consists of a pair of related words followed by four pairs of words. Select the pair that best expresses the relation in the original pair.
41. INTIMATE : CLOSE
- (A) evanescent : permanency  
(B) articulate : speech  
(C) enclose : parentheses  
(D) obsessed : attracted
42. QUISLING : BETRAY
- (A) appreciate : provoke  
(B) inception : termination  
(C) juggernaut : crush  
(D) obstinate : preserve

**PART - B**  
**TECHNICAL**

43. In DPSK technique, the technique used to encode bits is :
- (A) AMI
  - (B) Differential code
  - (C) Unipolar RZ format
  - (D) Manchester format
44. If the CRC has Polynomial of degree  $n$ , then what is the probability of detecting errors greater than  $n$  ?
- (A)  $\frac{1}{2^{n-1}}$
  - (B)  $\frac{1}{2^{n+1}}$
  - (C)  $\frac{1}{2^n}$
  - (D)  $\frac{1}{2^{n+2}}$
45. The DoS attack, in which the attacker establishes a large number of half-open or fully open TCP connections at the target host is \_\_\_\_\_.
- (A) Vulnerability attack
  - (B) Bandwidth flooding
  - (C) Connection flooding
  - (D) UDP flooding
46. In CSMA/CD after detecting the collision, station immediately stops transmission by sending the \_\_\_\_\_.
- (A) Stop pattern
  - (B) Preamble pattern
  - (C) Jam signal
  - (D) Block signal
47. Elicitation of requirements is a \_\_\_\_\_.
- (A) SDLC Process
  - (B) Cyclic Process
  - (C) SRS Process
  - (D) Development Process
48. Which of the following problems is undecidable ?
- (A) Membership problem for CFGs.
  - (B) Ambiguity problem for CFGs.
  - (C) Finiteness problem for FSAs.
  - (D) Equivalence problem for FSAs.
49. Let the predicates  $D(x, y)$  mean "team  $x$  defeated team  $y$ " and  $P(x, y)$  mean "team  $x$  has played team  $y$ ". The quantified formula for the statement that there is a team that has beaten every team it has played, is :
- (A)  $\exists x \forall y (P(x, y) \rightarrow D(x, y))$
  - (B)  $\forall x \exists y (P(x, y) \rightarrow D(x, y))$
  - (C)  $\forall y \exists x (P(x, y) \rightarrow D(x, y))$
  - (D)  $\exists x \forall y (D(x, y) \rightarrow P(x, y))$
50. One of the purposes of using intermediate code in compilers is to :
- (A) make parsing and semantic analysis simpler.
  - (B) improve error recovery and error reporting.
  - (C) increase the chances of reusing the machine - independent code optimizer in other compilers.
  - (D) improve the register allocation.

51. With usual notations, the properties of maxima and minima under various conditions are \_\_\_\_\_.

I	II
(P) Maxima	(i) $rt - s^2 = 0$
(Q) Minima	(ii) $rt - s^2 < 0$
(R) Saddle Point	(iii) $rt - s^2 > 0, r > 0$
(S) Case of failure	(iv) $rt - s^2 > 0, r < 0$

- (A) (P) - (i), (Q) - (iii), (R) - (iv), (S) - (ii)  
 (B) (P) - (ii), (Q) - (i), (R) - (iii), (S) - (iv)  
 (C) (P) - (iii), (Q) - (iv), (R) - (ii), (S) - (i)  
 (D) (P) - (iv), (Q) - (iii), (R) - (ii), (S) - (i)

52. The number of full and half-adders required to add 16-bit numbers is :

- (A) 8 half-adders, 8 full-adders  
 (B) 1 half-adder, 15 full-adders  
 (C) 16 half-adders, 0 full-adders  
 (D) 4 half-adders, 12 full-adders

53. Energy of power signal is :

- (A) Finite (B) Zero  
 (C) Infinite (D) 1

54. Suppose a binary search tree has been constructed from the following sequence of numbers in the order in which they arrive : 6, 2, 10, 1, 5, 7, 11, 3, 9, 4, 8. Consider the following piece of code :

```
Show(root) { if (root !=NULL)
    { printf("% d", root → key);
      show (root → right);
      show (root → left);
    }
  else
  return ;
}
```

The sequence printed will be :

- (A) 6, 11, 10, 7, 8, 9, 2, 4, 3, 5, 1  
 (B) 6, 11, 7, 9, 8, 10, 2, 5, 1, 3, 4  
 (C) 6, 10, 11, 7, 9, 8, 2, 5, 3, 4, 1  
 (D) 6, 10, 2, 11, 7, 9, 8, 5, 3, 4, 1

55. Which of the following is not a stable sorting algorithm ?

- (A) Insertion sort  
 (B) Selection sort  
 (C) Bubble sort  
 (D) Merge sort

56. More than one word is put in one cache block to :

- (A) exploit the temporal locality of reference in a program.  
 (B) exploit the spatial locality of reference in a program.  
 (C) reduce the miss penalty.  
 (D) none of the option.

57. Total number of nodes at the  $n^{\text{th}}$  level of a full binary tree can be given as \_\_\_\_\_.

- (A)  $2n + 1$  (B)  $2n^2$   
 (C)  $2^n$  (D)  $2n - 1$

58. Which one of them is a good software ?

- (A) High cohesion Low coupling  
 (B) Low cohesion high coupling  
 (C) High cohesion high coupling  
 (D) Low cohesion low coupling

59. Given the two statements S1 and S2 for software engineering :

S1 : Statement coverage cannot guarantee execution of loops in program under test.

S2 : Use of independent path testing criterion guarantees execution of each loop in a program under test more than once.

Then which among the following is true ?

- (A) S1 is True, S2 is True  
 (B) S1 is True, S2 is False  
 (C) S1 is False, S2 is True  
 (D) S1 is False, S2 is False



60. Consider the grammar with nonterminals  $N = \{S, C, S_1\}$  terminals  $T = \{a, b, i, t, e\}$  With  $S$  as the start symbol, and the following set of rules :  
 $S \rightarrow i C t S S_1 | a$   
 $S_1 \rightarrow e s | \epsilon$   
 $C \rightarrow b$   
 The grammar is not LL(1) because :  
 (A) It is left recursive  
 (B) It is right recursive  
 (C) It is ambiguous  
 (D) It is not context free
61. A binary sequence  $b[n]$  is given as shown below  $b[n] =$   
 $\{0, 1, 1, 0, 0, 0, 0, 1, 0, 1, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 1, 0, 1, 1, 0, 0, 0, 0, 1, 1, 0, 1\}$   
 Consider the following statements regarding the above coded sequence :  
 (i) It has a DC null in the PSD.  
 (ii) It possesses error detecting capability.  
 (iii) It possesses error correcting capability.  
 (iv) It facilitates clock recovery at the receiver.  
 Which of the above statements are true ?  
 (A) (i), (iii) and (iv)  
 (B) (i), (ii) and (iv)  
 (C) (i), (ii) and (iii)  
 (D) (ii), (iii) and (iv)
62. A demultiplexer is used to :  
 (A) Route the data from single input to one of many outputs.  
 (B) Perform serial to parallel conversion.  
 (C) Both (A) and (B).  
 (D) Select data from several inputs and route it to single output.
63. Consider the relations :  
 $R_1\{\text{Roll\_no, Name, Grades}\}$  and  
 $R_2\{\text{Roll\_no, Subject\_ID, Grades}\}$   
 Which of the following operations cannot be performed using the above relations ?  
 (A) Union (B) Select  
 (C) Join (D) Project
64. Which of the following system calls results in the sending of SYN packets ?  
 (A) Socket (B) Bind  
 (C) Listen (D) Connect
65. When the left sub-tree of the tree is one level higher than that of the right sub-tree, then the balance factor is \_\_\_\_\_.  
 (A) 0 (B) 1  
 (C) -1 (D) 2
66. Let  $C(n, r) = \binom{n}{r}$ . The value of  $\sum_{k=0}^{20} (2k+1) C(41, 2k+1)$ , is :  
 (A)  $40(2)^{40}$  (B)  $40(2)^{39}$   
 (C)  $41(2)^{40}$  (D)  $41(2)^{39}$
67. \_\_\_\_\_ is the most general phase structured grammar.  
 (A) Regular  
 (B) Context free  
 (C) Context sensitive  
 (D) All of the above

68. Equalization process includes :
- (A) maximum likelihood sequence estimation and equalization with filters
  - (B) maximum likelihood sequence estimation
  - (C) equalization with filters
  - (D) constant impulse response
69. If for the matrix  $A$ ,  $A^3 = I$  then  $A^{-1} =$  \_\_\_\_\_.
- (A)  $A^2$
  - (B)  $A^3$
  - (C)  $A$
  - (D) None of these
70. Given the following characteristics :
- (i) Optimal substructure
  - (ii) Overlapping subproblems
  - (iii) Memorization
  - (iv) Decrease and conquer
- Dynamic programming has the following characteristics :
- (A) (i), (ii), (iv)      (B) (i), (ii), (iii)
  - (C) (ii), (iii), (iv)    (D) (i), (iii), (iv)
71. Which NetWare protocol works on layer 3-network layer of the OSI model ?
- (A) IPX                      (B) NCP
  - (C) SPX                     (D) NetBIOS
72. The time complexity of solving the Longest Common Subsequence problem using Dynamic Programming is : (m and n are lengths of subsequences)
- (A)  $O(m.n)$               (B)  $O(m+n)$
  - (C)  $O(\log m.n)$          (D)  $O(m/n)$
73. Consider a system with page size p and average process size m and size of each page table entry is e. What is the amount of space required by page table ?
- (A)  $me/p$                   (B)  $mp/e$
  - (C)  $mpe$                     (D)  $pe/m$
74. The recurrence relation for binary search algorithm is :
- (A)  $T(n) = 2T(n/2) + O(1)$
  - (B)  $T(n) = 2T(n/2) + O(n)$
  - (C)  $T(n) = T(n/2) + O(1)$
  - (D)  $T(n) = T(n/2) + O(n)$
75. The largest number of faces in a simple connected maximal planar graph with 100 vertices is :
- (A) 200                      (B) 198
  - (C) 196                      (D) 96
76. If  $T_1$  and  $T_2$  are two Turing machines. The composite can be represented using the expression :
- (A)  $T_1T_2$
  - (B)  $T_1 \cup T_2$
  - (C)  $T_1 \times T_2$
  - (D) None of the options
77. What is the main focus of Reverse Engineering (RE) ?
- (A) Data base structure
  - (B) S/W file structure
  - (C) Memory
  - (D) CPU Utilization

78. Consider a relation R with attributes {A, B, C} and functional dependency set  $S = \{A \rightarrow B, A \rightarrow C\}$ . Then relation R can be decomposed into two relations :

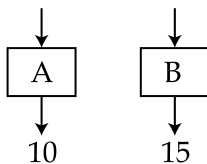
- (A)  $R_1\{A, B\}$  AND  $R_2\{A, C\}$
- (B)  $R_1\{A, B\}$  AND  $R_2\{B, C\}$
- (C)  $R_1\{A, B, C\}$  AND  $R_2\{A, C\}$
- (D) None of the above

79. What happens when a bit string is XORed with itself n times as shown below ?

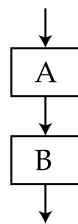
$[B \oplus (B \oplus (B \oplus (B \dots \dots n \text{ times})$

- (A) Complements when n is even
- (B) Complements when n is odd
- (C) Divides by  $2^n$  always
- (D) Remains unchanged when n is even

80. The Cyclomatic complexity of two modules A and B are 10 and 15 respectively :



What is the cyclomatic complexity of sequential integration of A and B ?



- (A) 19
- (B) 21
- (C) 24
- (D) 25

81. In a network, If P is the only packet being transmitted and there was no earlier transmission, which of the following delays could be zero ?

- (A) Propagation delay
- (B) Queuing delay
- (C) Transmission delay
- (D) Processing delay

82. The postfix equivalent of the infix expression  $(a + b)^*(c * d - e)^* f / g$  is :

- (A)  $ab + cd^*e - fg^* / ^*$
- (B)  $ab + cd^*e - fg / ^**$
- (C)  $ab + cde^* - fg / ^**$
- (D)  $abcd + e^*fg - / ^**$

83. Assume that P and NP are different i.e.  $P \neq NP$  then for the expression  $NP\text{-Complete} \cap P = ?$  Which among the following is correct ?

- (A) NP-Hard
- (B)  $\emptyset$
- (C) P
- (D) NP-Complete

84. Let  $f(A, B) = \bar{A} + B$ , Simplified expression for function  $f(f(x + y, y), z)$  is :

- (A)  $\bar{x} + z$
- (B)  $xyz$
- (C)  $x\bar{y} + z$
- (D) None of the options

85. Worst case scenario in case of linear search algorithm is \_\_\_\_\_.

- (A) Item is somewhere in the middle of the array
- (B) Item is not in the array at all
- (C) Item is the last element in the array
- (D) Item is the last element in the array or is not there at all

86. In the case of, Zero-address instruction method the operands are stored in \_\_\_\_\_.
- (A) Registers  
(B) Accumulators  
(C) Push down stack  
(D) Cache
87. Consider the following statements :  
I - The primary key of a relation cannot contain null values.  
II - Unique Key can have null values.  
Which among the following is true ?
- (A) Both I and II are true  
(B) Both I and II are false  
(C) Only I is true  
(D) Only II is true
88. Let  $L = L_1 \cap L_2$  where  $L_1$  and  $L_2$  are language defined below :
- $$L_1 = \{ a^m b^m c a^n b^n \mid m, n \geq 0 \}$$
- $$L_2 = \{ a^i b^j c^k \mid i, j, k \geq 0 \}$$
- Then L is :
- (A) Not Recursive  
(B) Regular  
(C) Context Free but not regular  
(D) Recursively enumerable but not context free
89. Which of the following step is not a part of the requirement engineering process ?
- (A) Feasibility Study  
(B) Programming Language Requirement Specification  
(C) Software Requirement Specification  
(D) Requirement Gathering & Validation
90. Let  $T(n)$  be the number of different binary search trees on  $n$  distinct elements-then
- $$T(n) = \sum_{k=1}^n T(k-1) T(n-k)$$
- where  $x$  is :
- (A)  $n-k+1$                       (B)  $n-k$   
(C)  $n-k-1$                       (D)  $n-k-2$
91. Which open addressing technique is free from Clustering problems ?
- (A) Linear probing  
(B) Quadratic probing  
(C) Double hashing  
(D) Rehashing
92. Given a graph with  $n$  vertices, deciding if there exists a clique of size  $\geq 195$  is :
- (A) Solvable in polynomial time  
(B) NP  
(C) NP-Complete  
(D) None of the above
93. To simulate a analog signal of frequency  $f$ , bandwidth requirement of channel is :
- (A)  $2f$                               (B)  $f$   
(C)  $f/2$                               (D)  $f/4$
94. A modulating signal  $m(t) = 10\cos(2\pi \times 10^3 t)$  is amplitude modulated with a carrier signal  $c(t) = 50\cos(2\pi \times 10^5 t)$ . Assume  $R = 1\Omega$ . Find the carrier power required for transmitting this AM wave.
- (A) 1000 W                          (B) 1250 W  
(C) 1100 W                          (D) 50 W

95. Which of the following Boolean algebra rules is correct ?
- (A)  $A \cdot \bar{A} = 1$   
 (B)  $A + AB = A + B$   
 (C)  $A(A + B) = B$   
 (D)  $A + \bar{A}B = A + B$
96. If  $R$  and  $D$  are the radius and diameter of the graph  $K_{4,7}$ , then the ordered pair  $(R, D)$  is equal to :
- (A) (2, 2)                      (B) (1, 2)  
 (C) (2, 4)                      (D) (1, 3)
97. For 8-ary signal or symbol the number of likelihood functions are :
- (A) 16                              (B) 8  
 (C) 9                                (D) 64
98. What is the annual change in traffic of software with 1 million lines of code with 30% lines added and 10% lines are deleted ?
- (A) 0.25                              (B) 0.15  
 (C) 0.4                                (D) 0.6
99. The covariance function of a band limited white noise is :
- (A) A Dirac delta function  
 (B) An exponentially decreasing function  
 (C) A sinc function  
 (D) A sinc<sup>2</sup> function
100. 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) and (C)
101. In what manner is a state-space tree for a backtracking algorithm constructed ?
- (A) Breadth-first search  
 (B) Twice around the tree  
 (C) Depth-first search  
 (D) Nearest neighbour first
102. Which multiple access technique is used by IEEE 802.11 standard for wireless LAN ?
- (A) CDMA                              (B) CSMA/CA  
 (C) ALOHA                              (D) CSMA/CD
103. 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) Circular header linked list

104. Consider the following sequence of micro operations :

MBR  $\leftarrow$  PC

MAR  $\leftarrow$  X

PC  $\leftarrow$  Y

MEMORY  $\leftarrow$  MBR

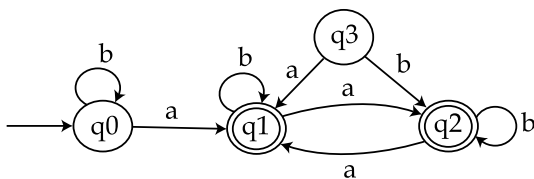
Which one of the following is possible operation performed by this sequence ?

- (A) Instruction Fetch
- (B) Operand Fetch
- (C) Conditional Branch
- (D) Initiation of interrupt service

105. In an ER Diagram, a double ellipse is used to represent :

- (A) Simple Attribute
- (B) Composite Attribute
- (C) Descriptive Attribute
- (D) Multi-valued Attribute

106. Consider the finite automata given below :



The language  $b$  accepted by this automata is given by the regular expression :

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

107. Let  $X$  be uniform random variable on  $[0, 4]$  and  $Y$  be uniform random variable on  $[0, 1]$ . If  $X$  and  $Y$  are independent, then  $P(\max \{X, Y\} > 3)$  is equal to :

- (A)  $1/4$
- (B)  $1/2$
- (C)  $1/8$
- (D)  $1$

108. The Highest Lower Bound on the number of Comparisons in the worst case for comparison-based sorting order of :

- (A)  $n$
- (B)  $n^2$
- (C)  $n \log n$
- (D)  $n \log_2 n$

109. Which one of the following cannot be scheduled by the kernel ?

- (A) Kernel level thread
- (B) User level thread
- (C) Process
- (D) None of the option

110. In VCO the output frequency is a linear function of its input :

- (A) Frequency
- (B) Voltage
- (C) Time period
- (D) None of the option

111. A microprogrammed control unit :

- (A) is faster than hardwired control unit
- (B) allows easy implementation of new instructions
- (C) is useful when small programs are to be run
- (D) none of the options

112. The File Transfer Protocol is built on \_\_\_\_\_.
- (A) data centric architecture  
 (B) service-oriented architecture  
 (C) client server architecture  
 (D) connection-oriented architecture
113. If a hash table is implemented as a search tree, the expected time required to enter  $n$  names and make  $m$  searches is proportional to :
- (A)  $(n+m) \log_2 n$   
 (B)  $(n+m) \log_2 m$   
 (C)  $mn \log_2 n$   
 (D)  $mn \log_2 m$
114. The real root of the equation  $x^3 - x - 5 = 0$  lying between 1 and 2 after first iteration by Newton-Raphson method is \_\_\_\_\_ if initial approximation is taken as  $x_0 = 2 \in [1, 2]$  :
- (A) 1.909                      (B) 1.904  
 (C) 1.921                      (D) 1.940
115. Consider a system with three frames in memory and following memory references in the working set  
 2 1 2 3 5 4 1 3 4 2 1  
 How many page fault will be there if we use second chance page replacement algorithm ?
- (A) 7                              (B) 8  
 (C) 9                              (D) 10
116. The addressing mode/s, which uses the PC instead of a general-purpose register is :
- (A) Indexed with offset  
 (B) Relative  
 (C) Direct  
 (D) Both Indexed with offset and direct
117. Non leaf nodes of B+ tree structure form a :
- (A) Multilevel sparse indices  
 (B) Multilevel dense indices  
 (C) Sparse indices  
 (D) Multilevel clustered indices
118.  $\iint \frac{xy}{\sqrt{1-y^2}} dx dy$  Over the positive quadrant of the circle  $x^2 + y^2 = 1$  is \_\_\_\_\_.
- (A)  $\frac{1}{6}$                               (B)  $\frac{2}{3}$   
 (C)  $\frac{5}{6}$                               (D)  $\frac{5}{3}$
119. 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
120. What is the main objective of ISO 9001 ?
- (A) Verification              (B) Validation  
 (C) S/W Testing              (D) H/W Testing

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**SPACE FOR ROUGH WORK**