

Science

Set No. : 1

Question Booklet No.

RET/17/TEST-B

886

Computer Science

(To be filled up by the candidate by blue/black ball point pen)

Roll No.

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Roll No. (Write the digits in words)

Serial No. of OMR Answer Sheet

Day and Date

(Signature of Invigilator)

INSTRUCTIONS TO CANDIDATES

(Use only blue/black ball-point pen in the space above and on both sides of the Answer Sheet)

1. Within 30 minutes of the issue of the Question Booklet, Please ensure that you have got the correct booklet and it contains all the pages in correct sequence and no page/question is missing. In case of faulty Question Booklet, Bring it to the notice of the Superintendent/Invigilators immediately to obtain a fresh Question Booklet.
2. Do not bring any loose paper, written or blank, inside the Examination Hall **except the Admit Card without its envelope.**
3. **A separate Answer Sheet is given. It should not be folded or mutilated. A second Answer Sheet shall not be provided.**
4. Write your Roll Number and Serial Number of the Answer Sheet by pen in the space provided above.
5. **On the front page of the Answer Sheet, write by pen your Roll Number in the space provided at the top, and by darkening the circles at the bottom. Also, wherever applicable, write the Question Booklet Number and the Set Number in appropriate places.**
6. **No overwriting is allowed in the entries of Roll No., Question Booklet No. and Set No. (if any) on OMR sheet and Roll No. and OMR sheet no. on the Question Booklet.**
7. **Any change in the aforesaid entries is to be verified by the invigilator, otherwise it will be taken as unfair means.**
8. **This Booklet contains 40 multiple choice questions followed by 10 short answer questions. For each MCQ, you are to record the correct option on the Answer Sheet by darkening the appropriate circle in the corresponding row of the Answer Sheet, by pen as mentioned in the guidelines given on the first page of the Answer Sheet. For answering any five short Answer Questions use five Blank pages attached at the end of this Question Booklet.**
9. For each question, darken only **one** circle on the Answer Sheet. If you darken more than one circle or darken a circle partially, the answer will be treated as incorrect.
10. **Note that the answer once filled in ink cannot be changed. If you do not wish to attempt a question, leave all the circles in the corresponding row blank (such question will be awarded zero marks).**
11. For rough work, use the inner back pages of the title cover and the blank page at the end of this Booklet.
12. **Deposit both OMR Answer Sheet and Question Booklet at the end of the Test.**
13. You are not permitted to leave the Examination Hall until the end of the Test.
14. If a candidate attempts to use any form of unfair means, he/she shall be liable to such punishment as the University may determine and impose on him/her.

Total No. of Printed Pages : 24

ROUGH WORK

रफ़ कार्य

Research Entrance Test-2017

No. of Questions : 50

प्रश्नों की संख्या : 50

Time : 2 Hours

समय : 2 घण्टे

Full Marks : 200

पूर्णाङ्क : 200

Note: (1) This Question Booklet contains **40** Multiple Choice Questions followed by **10** Short Answer Questions.

इस प्रश्न पुस्तिका में **40** वस्तुनिष्ठ व **10** लघु उत्तरीय प्रश्न हैं।

(2) Attempt as many MCQs as you can. Each MCQ carries **3 (Three)** marks. **1 (One)** mark will be deducted for each incorrect answer. **Zero** mark will be awarded for each unattempted question. If more than one alternative answers of MCQs seem to be approximate to the correct answer, choose the closest one.

अधिकाधिक वस्तुनिष्ठ प्रश्नों को हल करने का प्रयत्न करें। प्रत्येक वस्तुनिष्ठ प्रश्न **3 (तीन)** अंकों का है। प्रत्येक गलत उत्तर के लिए **1 (एक)** अंक काटा जायेगा। प्रत्येक अनुत्तरित प्रश्न का प्राप्तांक शून्य होगा। यदि वस्तुनिष्ठ प्रश्नों के एकाधिक वैकल्पिक उत्तर सही उत्तर के निकट प्रतीत हों, तो निकटतम सही उत्तर दें।

(3) Answer only **5** Short Answer Questions. Each question carries **16 (Sixteen)** marks and should be answered in **150-200** words. Blank **5 (Five)** pages attached with this booklet shall only be used for the purpose. Answer each question on separate page, after writing Question No.

केवल **5 (पाँच)** लघुउत्तरीय प्रश्नों के उत्तर दें। प्रत्येक प्रश्न **16 (सोलह)** अंकों का है तथा उनका उत्तर **150-200** शब्दों के बीच होना चाहिए। इसके लिए इस पुस्तिका में लगे हुए सादे **5 (पाँच)** पृष्ठों का ही उपयोग आवश्यक है। प्रत्येक प्रश्न का उत्तर एक नए पृष्ठ से, प्रश्न संख्या लिखकर शुरू करें।

- 01.** Booklungs are found in :
(1) Amoeba (2) Polystomella
(3) Euglypha (4) Arachnids
- 02.** Silk is obtained from :
(1) Adult moth (2) Caterpillar stage
(3) Egg (4) Cocoon
- 03.** Neurogenic heart is found in :
(1) Human beings (2) Rat
(3) Rabbit (4) Invertebrates
- 04.** Epiphysis is also known as :
(1) Pineal (2) Pituitary
(3) Thyroid (4) Hypothalamus
- 05.** Simplest and smallest form of amino acid is :
(1) Glycine (2) Proline
(3) Lysine (4) Argenine
- 06.** PCOS is related to :
(1) Ovary (2) Uterus
(3) Testes (4) Oviduct
- 07.** Seminogelin is secreted by :
(1) Epididymis (2) Seminal Vesicle
(3) Thecal cells (4) Oviduct
- 08.** First cleavage in frog is :
(1) Horizontal (2) Meridional
(3) Equatorial (4) Latitudinal

09. Which of the following is nuclear receptor ?

- | | |
|--------|----------|
| (1) AR | (2) GPCR |
| (3) IR | (4) MT1 |

10. Cryptorchidism is related to :

- | | |
|------------|--------------|
| (1) Testes | (2) Thyroid |
| (3) Ovary | (4) Pancreas |

11. Consider the following C program :

```
# define int char
main ()
{
int i=65;
printf (" sizeo f (i) = % d" , sizeof(i));
}
```

The output of the program will be :

- | | |
|------------------|---------------|
| (1) sizeof=1 | (2) sizeof(1) |
| (3) sizeof (i)=1 | (4) 1 |

12. Consider the following c program :

```
main ()
{
int i=10;
i=i>14;
print f("i=%d",i);
}
```

The output of the progrm will be :

- | | |
|--------|--------|
| (1) 14 | (2) 10 |
| (3) 1 | (4) 0 |

13. A RAM chip has capacity of 1024 words of 8 bits each (1K×8). The number of 2×4 decoders with enable line needed to construct a 16K ×16 RAM from 1K×8 RAM is
- (1) 4 (2) 5
(3) 6 (4) 7
14. The instructions which copy information from one location to another either in the processor's internal register set or in the external main memory are called :
- (1) Data transfer instructions.
(2) Program control instructions.
(3) Input-output instructions.
(4) Logical instructions.
15. The wrong statements/s regarding interrupts and subroutines among the following is/are
- i. The sub-routine and interrupts have a return statement
ii. Both of them alter the content of the PC
iii. Both are software oriented
iv. Both can be initiated by the user
- (1) i,ii and iv (2) ii and iii
(3) iv (4) iii and iv
16. When simplified with Boolean Algebra, the expression $(x+y)(x+z)$ simplifies to
- (1) x (2) $x+x(y+z)$
(3) $x(1+yz)$ (4) $x+yz$
17. How many 1's are present in the binary representation of $3 \times 512 + 7 \times 64 + 5 \times 8 + 3$
- (1) 8 (2) 9
(3) 10 (4) 11

18. The output of D-flip flop :

- (1) Same as input. (2) complement of input.
(3) not depend on input. (4) depend on past input and clock.

19. Which of the following services use TCP ?

- (1) sftp (2) smtp
(3) http (4) all of the above

20. Given memory partition of 100K, 500K, 200K, 300K, and 600K (in order) and processes of 212K, 417K, 70K, and 96K (in order); using the first-fit partition algorithm, in which partition would be the process requiring 96K be placed :

- (1) 500K (2) 300K
(3) 200K (4) 600K

21. Consider the following segment of C program

```
man()
{
    int i, j;
    j=0;
    for (i=0; i<=5, i=i+2/3)
    {
        j=j+1;
    }
}
```

The number of times the body of for loop is executed:

- (1) 9 (2) 8
(3) infinite (4) 11

22. Among the following which one is the worst case recurrence relation and worst case time complexity of Quick Sort:
- (1) Recurrence is $T(n) = T(n-2) + O(n)$ and time complexity is $O(n^2)$
 - (2) Recurrence is $T(n) = T(n-1) + O(n)$ and time complexity is $O(n^2)$
 - (3) Recurrence is $T(n) = 2T(n/2) + O(n)$ and time complexity is $O(n \log n)$
 - (4) Recurrence is $T(n) = T(n/10) + T(9n/10) + O(n)$ and time complexity is $O(n \log n)$
23. The preorder traversal of a binary tree is DEBFCA. The root node of binary tree is :
- (1) B
 - (2) C
 - (3) A
 - (4) D
24. Chromatic number of bipartite graph is :
- (1) 4
 - (2) 2
 - (3) 3
 - (4) 1
25. Let $T(n)$ be the function defined by $T(0)=1$ and $T(n) = T(n-1) + n, n \geq 1$. which of the following is true:
- (1) $T(n) = O(n^2)$
 - (2) $T(n) = O(\sqrt{n})$
 - (3) $T(n) = O(\log_2 n)$
 - (4) $T(n) = O(n)$

30. Grammar corresponding production rules $\{S \rightarrow CC, C \rightarrow aC, C \rightarrow d\}$ is :

- (1) LL(1) (2) SLR (1) but not LL (1)
 (3) LALR (1) but not SLR (1) (4) LR (1) but not LALR (1)

31. A bottom-up parser generates :

- (1) Leftmost derivation (2) Right most derivation
 (3) Leftmost derivation in reverse (4) Rightmost derivation in reverse

32. $S \rightarrow aB^+bA, A \rightarrow a \text{ or } bAA, B \rightarrow b \text{ or } aBB$, generates strings of terminal that have :

- (1) odd number of a's and b's
 (2) even number of a's and b's
 (3) equal number of a's and b's
 (4) not equal number of a's and b's

33. Postfix expression equivalent of infix expression $(A-B) * (D/E)$ is :

- (1) $ABDE^*/-$ (2) $ABDE-/*$
 (3) $AB-DE/*$ (4) None of these

34. An operating system implements a policy that requires a process to release all resources before making a request for another resources. Select the TRUE statement from the following :
- (1) Both starvation and deadlock can occur
 - (2) Starvation can occur but deadlock cannot occur
 - (3) Starvation cannot occur but deadlock can occur
 - (4) Neither starvation nor deadlock can occur
35. Consider three processes (process id 0, 1,2 respectively) with compute time bursts 2,4 and 8 time units. All processes arrive at time zero. Consider the longest remaining time first (LRTF) scheduling algorithm. In LRTF ties are broken by giving priority to the process with the lowest process id. The average turnaround time is :
- | | |
|--------------|-------------|
| (1) 13 units | (2) 14units |
| (3) 15units | (4) 16units |
36. Page fault occurs when :
- (1) When a requested page is in memory
 - (2) When a requested page is not in memory
 - (3) When a page is corrupted
 - (4) When an exception is thrown

37. Relationships among relationships can be represented in an E-R model using :
- (1) aggregation
 - (2) association
 - (3) weak entity sets
 - (4) weak relationship sets
38. Which one of the following statements about normal forms is FALSE ?
- (1) BCNF is stricter than 3NF
 - (2) Lossless, dependency-preserving decomposition into 3NF is always possible
 - (3) Lossless, dependency-preserving decomposition into BCNF is always possible
 - (4) Any relation with two attributes is in BCNF
39. Let E1 and E2 be two entities in an E/R diagram with simple single-valued attributes. R1 and R2 are two relationships between E1 and E2, where R1 is one-to-many and R2 is many-to-many. R1 and R2 do not have any attributes of their own. Minimum number of tables required to represent this situation in the relational model is :
- (1) 2
 - (2) 5
 - (3) 4
 - (4) 3
40. A single packet on a data link layer is known as :
- (1) Path
 - (2) Frame
 - (3) Block
 - (4) Group

Short Answer Questions

Note: Attempt any **five** questions. Write answer in **150-200** words. Each question carries **16** marks. Answer each question on separate page, after writing Question Number.

01. Give data structure in which linear list is implemented using random access. Using this representation/ data structure write an algorithm for inserting and deleting an element form the list.

02. Suppose the following list of letters is inserted in order into an empty binary search tree:

J,R,D,G,T,E,M,H,P,A,F,Q

i. Find the final binary tree.

ii. Give sequential representation of the tree in (i).

iii. Find the inorder, preorder, and postorder traversal of binary tree.

iv. Consider the binary tree (i), give tree after the node M and D is deleted.

03. (a) i. How structure differ from array ?

ii. How structure, union, and bit filed differ from each other.

(b). Define a structure called *cricket* that will describe the information *player name, team name, batting average*. Using structure *cricket*, declare an array *player* with 5 elements.

- (c). In what ways does a switch statement differ from if statement. Write a C program for marks range to grade conversion using switch and case, for following data:

Marks Range	Grade
< 40	E
40 - 54	D
55 - 69	C
70 - 85	B
> 85	A

04. Construct LR (1) parsing table for the given grammar :

$S \rightarrow CC,$
 $C \rightarrow aC,$
 $C \rightarrow d$

05. Define deterministic and nondeterministic finite automaton (DFA and NFA). Consider the finite state machine. $M=(Q, \Sigma, \delta, q_0, F)$, where $Q = \{q_0, q_1, q_2, q_3\}$, $\Sigma = \{0, 1\}$, $F = \{q_0\}$, and transition function δ is given in following table :

State	Input	
	0	1
q_0	q_2	q_1
q_1	q_3	q_0
q_2	q_0	q_3
q_3	q_1	q_2

Give the entire sequence of states for the input string 110001.

06. Consider a main memory with five page frames and the following sequence of page references: 3,8,2,3,9,1,6,3,8,9,3,6,2,1,3. Calculate the number of page faults by using page replacement policies (i) First in-First Out (FIFO) and (ii) Least Recently Used (LRU).
07. Represent following facts using proposition. And find what rules of inference is used in each of these argument :
- (i) Alice is mathematics major. Therefore, Alice is either mathematics major or a computer science major.
 - (ii) Jerry is mathematics major and a computer science major. Therefore, Jerry is mathematics major.
 - (iii) If, I go swimming, then, I will stay in the sun too long. If, I stay in the sun too long, then I will sun burn. Therefore, if I go swimming then I will sun burn.
08. Explain the concept of primary key, and normalization in the context of relational database system.
09. Describe major phases of waterfall model of software development ? Which phase consumes maximum effort ?
10. Explain how TCP is a reliable protocol when it works on top of IP which is unreliable.

Question No.

Page for Short Answer

Question No.

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ROUGH WORK

रफ़ कार्य

अभ्यर्थियों के लिए निर्देश

(इस पुस्तिका के प्रथम आवरण पृष्ठ पर तथा उत्तर-पत्र के दोनों पृष्ठों पर केवल नीली-काली बाल-प्वाइंट पेन से ही लिखें)

1. प्रश्न पुस्तिका मिलने के 30 मिनट के अन्दर ही देख ले कि प्रश्नपत्र में सभी पृष्ठ मौजूद हैं और कौन-कौनसे प्रश्न छूटा नहीं है। पुस्तिका दोषयुक्त पाये जाने पर इसकी सूचना तत्काल कक्ष-निरीक्षक को देकर सम्पूर्ण प्रश्नपत्र की दूसरी पुस्तिका प्राप्त कर लें।
2. परीक्षा भवन में लिफाफा रहित प्रवेश-पत्र के अतिरिक्त, लिखा या सादा कोई भी खुला कागज साथ में न लायें।
3. उत्तर-पत्र अलग से दिया गया है। इसे न तो मोड़ें और न ही विकृत करें। दूसरा उत्तर-पत्र नहीं दिया जायेगा केवल उत्तर-पत्र का ही मूल्यांकन किया जायेगा।
4. अपना अनुक्रमांक तथा उत्तर-पत्र का क्रमांक प्रथम आवरण-पृष्ठ पर पेन से निर्धारित स्थान पर लिखें।
5. उत्तर-पत्र के प्रथम पृष्ठ पर पेन से अपना अनुक्रमांक निर्धारित स्थान पर लिखें तथा नीचे दिये वृत्तों को गाढ़ा कर दें। जहाँ-जहाँ आवश्यक हो वहाँ प्रश्न-पुस्तिका का क्रमांक तथा सेट का नम्बर उचित स्थान पर लिखें।
6. ओ० एम० आर० पत्र पर अनुक्रमांक संख्या, प्रश्नपुस्तिका संख्या व सेट संख्या (यदि कोई हो) तथा प्रश्नपुस्तिका पर अनुक्रमांक और ओ० एम० आर० पत्र संख्या की प्रविष्टियों में उपरिलेखन की अनुमति नहीं है।
7. उपर्युक्त प्रविष्टियों में कोई भी परिवर्तन कक्ष निरीक्षक द्वारा प्रमाणित होना चाहिये अन्यथा यह एक अनुचित साधन का प्रयोग माना जायेगा।
8. प्रश्न-पुस्तिका में प्रत्येक प्रश्न के चार वैकल्पिक उत्तर दिये गये हैं। प्रत्येक प्रश्न के वैकल्पिक उत्तर के लिए आपको उत्तर-पत्र की सम्बन्धित पंक्ति के सामने दिये गये वृत्त को उत्तर-पत्र के प्रथम पृष्ठ पर दिये गये निर्देशों के अनुसार पेन से गाढ़ा करना है।
9. प्रत्येक प्रश्न के उत्तर के लिए केवल एक ही वृत्त को गाढ़ा करें। एक से अधिक वृत्तों को गाढ़ा करने पर अथवा एक वृत्त को अपूर्ण भरने पर वह उत्तर गलत माना जायेगा।
10. ध्यान दें कि एक बार स्याही द्वारा अंकित उत्तर बदला नहीं जा सकता है। यदि आप किसी प्रश्न का उत्तर नहीं देना चाहते हैं, तो संबंधित पंक्ति के सामने दिये गये सभी वृत्तों को खाली छोड़ दें। ऐसे प्रश्नों पर शून्य अंक दिये जायेंगे।
11. रफ कार्य के लिए प्रश्न-पुस्तिका के मुखपृष्ठ के अंदर वाला पृष्ठ तथा उत्तर-पुस्तिका के अंतिम पृष्ठ का प्रयोग करें।
12. परीक्षा के उपरान्त केवल ओ एम आर उत्तर-पत्र परीक्षा भवन में जमा कर दें।
13. परीक्षा समाप्त होने से पहले परीक्षा भवन से बाहर जाने की अनुमति नहीं होगी।
14. यदि कोई अभ्यर्थी परीक्षा में अनुचित साधनों का प्रयोग करता है, तो वह विश्वविद्यालय द्वारा निर्धारित दंड का काँका भागी होगा/होगी।