TEST SERIES NTA-UGC-NET/JRF JUNE 2019

BOOKLET SERIES A

Paper Code 87

Test Type: TEST SERIES

COMPUTER SCIENCE & APPLICATIONS

Duration: 01:30 Hours

Date: 18-05-2019

Maximum Marks: 140

Read the following instructions carefully:

1. Single Paper Test is divided into **TWO** Parts.
2. **Part - I:** This part shall carry **20** questions. Each question shall be of **2 marks.**
3. **Part - II:** This part shall contain **50** questions. Each question shall be of **2 marks**.
4. There will be no negative marking.
5. Darken the appropriate bubbles with HB pencil/Ball Pen to write your answer.
6. The candidates shall be allowed to carry the Question Paper Booklet after completion of the exam.

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PAPER – I

1. What should come in place of question mark (?) in the series given below ?

68	130	222	350	?

(a) 498 (b) 510 (c) 500 (d) 520

2. In a certain code language
(i) 'Do greater good' is coded as '534',
(ii) 'Be good boy' is coded as '231',
(iii) 'Be greater' is coded as '42'
What is the code used for 'Boy' ?
(a) 2 (b) 1 (c) 3 (d) 4

3. A courier boy starts delivering letters 3 km southwards and then turns right. He covers 4 km on this road and again turns right. He delivers letters for 3 km and completes his daily beat. Then he turns left for lunch at home, which is 5 km away. How far he has to travel to reach the post office after lunch?
(a) 15 km (b) 10 km (c) 9 km (d) 8 km

4. A and B are brothers, but C is sister of B.
E is father of A and F is mother of B.
If C is married to D, then how is D related to F ?
(a) Uncle (b) Son (c) Grandson (d) Son-in-law

5. How many kg of pure sugar should be added to 30 kg of 2 % solution of sugar and water to increase it to a 10% solution?

(a) $2\frac{1}{3}$ (b) $2\frac{2}{3}$ (c) $3\frac{1}{3}$ (d) $1\frac{1}{3}$

6. The least multiple of 7, which leaves a remainder of 4, when divided by 6, 9, 15 and 18 is
(a) 144 (b) 364 (c) 284 (d) 120

7. Six students A, B, C, D, E, F are there in a class.
A is as tall as C.
B is younger than C, but older than E.
D is older than both A and B.
If E is the youngest student, then who is the tallest among the students ?
(a) F (b) A (c) D (d) B

8. 10 men can complete a piece of work in 15 days and 15 women can complete the same work in 12 days. In how many days 10 men and 15 women working together can complete the work?

(a) 7 (b) $8\frac{1}{3}$ (c) $6\frac{2}{3}$ (d) Can't be determined

9. **Direction:** In the question below is given few statements followed by the conclusions numbered accordingly. You have to take the given statements to be true even if they seem to be at variance from commonly known facts and then decide which of the given conclusions logically follows from the statements disregarding commonly known facts.

Statements:
1. All A are B
2. All C are D
3. All B are C
4. Some A are E

Conclusions:
I. All B are A
II. All D are C
III. Some B are E

(a) Only II follows (b) Either I or II follows
(c) Only III follows (d) None of follows

10. In how many different ways can the letters of the word 'RUMOUR' be arranged?
(a) 180 (b) 90 (c) 30 (d) 720

Common Data Questions: Q.11 to Q. 15

Below is given the table which shows the expenditures of a Company in Lakh Rupees over the five years from 1998 to 2002. Based on the information provided in the table you have to answer the questions below:

EXPENDITURES OF A COMPANY (IN LAKH RUPPES) PER ANNUM OVER THE GIVEN YEARS

Item of expenditure → Year ↓	Salary	Fuel and Transport	Bonus	Interest on Loans	Taxes
1998	288	98	3.00	23.4	83
1999	342	112	2.52	32.5	108
2000	324	101	3.84	41.6	74
2001	336	133	3.68	36.4	88
2002	420	142	3.96	49.4	98

11. The ratio between the total expenditure on Taxes for all the years and the total expenditure of Fuel and Transport for all the years respectively is a approximately:
(a) 4 : 7 (b) 10 : 13 (c) 15 : 18 (d) 5 : 8

12. The total expenditure of the Company over these items during the year 2000 is
(a) ` 544.44 lakhs (b) ` 501.11 lakhs (c) ` 446.46 lakhs (d) ` 478.87 lakhs

13. What is the approximate average amount of interest per year which the Company had to pay during this period ?
(a) ` 32.43 lakhs (b) ` 33.72 lakhs (c) ` 36.66 lakhs (d) None of these

14. Total expenditure on all these in 1998 was approximately what percent of the total expenditure in 2002 ?
(a) 62 % (b) 66 % (c) 69 % (d) 71 %

15. The total amount of bonus paid by the Company during the given period is approximately what percent of the total amount of salary paid during this period ?
(a) 0.1 % (b) 0.5 % (c) 1 % (d) 1.25 %

16. The rules of presenting the contents to make them easy are called
(a) Method of teaching (b) Maxims of teaching
(c) Techniques of teaching (d) Teaching strategies

17. The Socratic method is known as
(a) Lecture demonstration method (b) Discussion method
(c)Inquiry method (d) Question- Answer method

18. Which one of the following is the most important elements in teaching?
(a) Relationship between teachers and students
(b) Subject matter
(c) Teaching techniques and aids used
(d) Student's knowledge

19. Complete this sentence. A hypothesis is:
(a) the methodical evaluation of research evidence.
(b) a statement of the aims of an investigation.
(c) a statement which serves as the basis for further investigation.
(d) all of these

20. Research in which the researcher uses both qualitative and quantitative research within a stage or across two of the stages in the research process is known as _____.
(a) action research (b) basic research
(c) quantitative research (d) mixed model research

PAPER – II

21. What is Cayley's formula to compute distinct trees on the set $\{v_1, v_2, ...,v_n\}$ of n nodes.
(a) n^{n-2} (b) n^{n-1} (c) n^{n+1} (d) n^{n+2}

22. Suppose we have key values 10, 20, 30, 40, 50, 60, 70, 80. We will insert these key values into B-tree of order 3. What will be the values at leaf nodes ?
(a) 10, 30, 50, 70, 80 (b) 10, 20, 30, 40 (c) 10, 20, 30, 40, 60 (d) None of these

23. Content of max heap is [25, 14, 16, 13, 10, 8, 12]. What will be the content after two deletion ?
(a) {14, 13, 12, 10, 8} (b) {14, 12, 13, 8, 10}
(c) {14, 13, 8, 12, 10} (d) None of these

24. Let I be the number of internal nodes and L be the number of leaves in tree. Assume we have a full n-ary tree, where L = 41 and n is 5. Find out value of I ?
(a) 9 (b) 10 (c) 11 (d) 12

25. S_1: Linked list is not suitable data-structure for binary search, but suitable for insertion sort.
S_2: Worst case running time of comparison based sorting algo is $O(n^2)$.
S_3: FIFO replacement uses stack data structure.
S_4: The node with minimum key can be obtained in O(log n) time in max-heap.
Which statement is/are TRUE ?
(a) S_1, S_2, S_3 (b) S_2, S_3, S_4 (c) S_1, S_2, S_4 (d) All of these

26. The sum of the heights of the subtrees in a maximal complete binary tree with n nodes and height h is
(a) n – h – 1 (b) n + h + 1 (c) n + h – 1 (d) None of these

27. S_1: In push operation for linked list implementation of queue, if new nodes are inserted at the begining of linked list, then in population, nodes must be removed from end.
S_2: In a circular queue of array representation
front = rear! = null; when it contains only one element.
S_3: A binary tree with n leaf has at least (log n) height.
S_4: Heapify operation takes O(n log n) time.
Which statement is/are TRUE ?
(a) S_1, S_2, S_3 (b) S_2, S_3, S_4 (c) S_1, S_3, S_4 (d) All of these

28. What will be the result, after evaluating the postfix expression:

20 15 + 80 8 / * 8 –

(a) 342 (b) 343 (c) 348 (d) None of these

29. 3 *x* 1 + log * *a* 2 / –

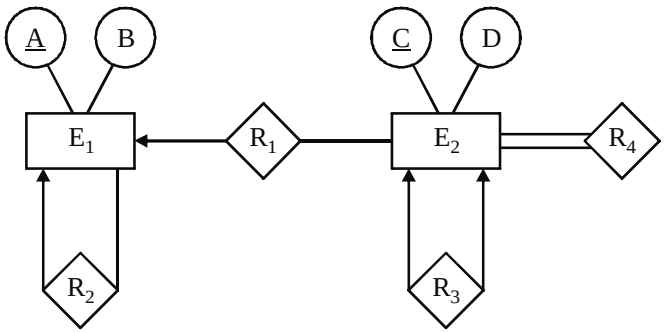
This is the postfix expression of

(a) $3*\log(x+1)-\frac{a}{2}$ (b) $\frac{3*\log(x+1)}{2}-a$ (c) $\frac{3*\log(x+1)-a}{2}$ (d) None of these

30. What will be the big-O estimate of this $(n^3 + 2^n)(\log n + \log\log n)(n! + 2^n)$ is

(a) $2^n n^n \log n$ (b) $2^{2n} \log n$ (c) $2^n n \log n$ (d) None of these

31. Consider the following ER diagram:



The minimum number of tables needed to store the above ER diagram is

(a) 4 (b) 2 (c) 1 (d) 3

32. Match the following:

List-1	List-2
A. Referential integrity	1. No duplicate rows in a table
B. Non-procedural language	2. Enforces match of primary key to foreign key
C. Natural join	3. Domain calculus
D. Entity integrity	4. Relational algebraic operation
E. NS-SQL	5. It required support of VM

(a) A-2, B-3, C-4, D-1, E-5 (b) A-2, B-3, C-1, D-4, E-5

(c) A-2, B-4, C-3, D-1, E-5 (d) A-1, B-4, C-3, D-2, E-5

33. Which of the following schedules is/are (conflict) serializable ?

$S_1 : r_1(X); w_1(X); r_2(X); w_2(X)$

$S_2 : r_1(X); w_1(X); r_2(X); r_1(Y); w_2(X); w_1(Y)$

$S_3 : r_1(X); w_1(X); r_2(X); r_2(Y); r_1(Y); w_2(X); w_1(Y)$

(a) S_1 and S_2 (b) S_1 and S_3 (c) S_1, S_2 and S_3 (d) None of these

34. In case of transaction failure under a deferred incremental logging scheme. Which of the following will be needed ?

(a) an undo operation (b) a redo operation

(c) an undo and redo operation (d) None of these

35. In a relation database, borrower (customer_name, loan_number), depositer (customer_name, account_number), loan (branch_name, loan_number, amount)

Find those customers who have loan in 'SBI' branch.

(i) $\sigma_{\text{borrower loan\_name}}(\sigma_{\text{branch\_name}=\text{"JNU"}}(\text{borrower} \times \text{loan}))$

(ii) $\pi_{\text{customer\_name}}(\sigma_{\text{borrow\_loan\_number}=\text{loan}\cdot\text{loan\_number}}(\text{borrower} \times \text{loan}))$

(a) (i) only (b) (ii) only (c) Both (i) and (ii) (d) Neither (i) nor (ii)

36. In an RDBMS with 6 attributes, how many super keys are possible ?

(a) 64 (b) 62 (c) 63 (d) None of these

37. A relation in RDBMS p, q, r, s, t with the following functional dependencies $p \to r$, $q \to s$, $(p, q) \to t$ in terms of normalization, this relation is in

(a) 1 NF (b) 2 NF (c) 3 NF (d) BCNF

38. Which of the following is/are not aggregate function.
(i) Avg (ii) Count (iii) Select
(iv) Max (v) Min (vi) Project
(a) (i), (ii), (iii) and (iv) (b) (iv) and (v) (c) (i), (ii) and (iv) (d) (iii) and (vi)

39. Data mining solution utilize, which of the following technologies to search data ?
(a) Artificial intelligence (b) Fuzzy logic
(c) Visualization (d) All of these

40. In your judgement, what do you consider is the most important advantage a NLP database access to the procures ?
(a) Queries will no longer be determined and limited to keywords.
(b) Allows a more friendly dialogue between man and machine.
(c) A more cost effective approach to database maintenance.
(d) None of the above.

41. Match the following:

List-1	List-2
P. Absorption law	1. $P \vee (P \wedge Q) \Leftrightarrow P$
Q. Implication law	2. $P \rightarrow Q = \neg P \vee Q$
R. Contrapositive	3. $P \rightarrow Q = \neg Q \rightarrow \neg P$
S. Horn Clause	4. $\neg P \vee Q$
T. Contradiction	5. $P \rightarrow \neg Q$

(a) P-1, Q-2, R-3, S-4, T-5 (b) P-2, Q-1, R-3, S-5, T-4
(c) P-3, Q-1, R-2, S-5, T-4 (d) None of these

42. We have a relation R on S{22, 23, 24} i.e., R = {(22, 22), (22, 23), (23, 23), (24, 24)}, then this relation is
(a) Equivalence (b) Symmetric only (c) Reflexive (d) None of these

43. The set S = {1, 2, 3, 4, 5, 6, 7, 8, 9} under modulo $+_{11}$ is a
(a) abelian group (b) group
(c) group without identity (d) it is not closed under $+_{11}$

44. If n objects are placed in m places for m < n, then one of the places must contain at least _____ objects.
(a) $\left[\frac{n-1}{m}\right]+1$ (b) $\left[\frac{n}{m-1}\right]+1$ (c) $\left[\frac{n-1}{m+1}\right]+1$ (d) None of these

45. We have a simple graph which have 9 nodes. Find the number of cycles of length 3. If the probability having an edge between any two nodes is 1/3 ?
(a) 3 (b) 4 (c) 5 (d) 6

46. What will be the expected value of the number on a die, when thrown. Assume die have values 1, 2, 3, 4, 5, 6, 7. It is 7 side die.
(a) 4 (b) 7 (c) 3 (d) 3.5

47. Let M represent the set of all math classes and let S represent the set of all students at your school. Then the statement. "There is at least one math student who own a cat" can be represented as
(a) $\exists s \in S, \exists n \in M, [E(s, m) \wedge C(s)]$ (b) $\exists s \in S, \exists n \in M, [E(m) \wedge C(s)]$
(c) $\exists n \in S, \exists s \in M, [E(m) \wedge C(s)]$ (d) None of these

48. A connected planar graph has 30 vertices each of degree 3. Into how many regions can this planar graph be split
(a) 17 (b) 18 (c) 19 (d) None of these

49. How many reflexive, relations can be generated on a set of A having n elements respectively ?
(a) $2^{n\frac{(n-1)}{2}}$ (b) 2^{n^2-n} (c) $2^{n\frac{(n+1)}{2}}$ (d) 2^{2^n}

50. Which one is not horne clause ?
(i) $p \to q$ (ii) $p \to \neg q$ (iii) $\neg(p \wedge q) \to r$ (iv) $p \to q \vee r$
(a) (i) only (b) (ii) only (c) (iii) only (d) (iv) only

51. Which of the following statements is/are correct?
(1) In a P2P network, having either Chord or Mesh. If RTT is 100 ms, links are fast (> 107 packets/sec), and there are 100 nodes. Then chord has lower search latency than Mesh.
(2) A router has received new IP addresses: 57.6.96.0/21, 57.6.104.0/21, 57.6.112.0/21, and 57.6.120.0/21 which are same.
(3) A hypervisor running on bare machine is a Type 1, VM and running on kernel Type2, VM.
(4) All cloud computing applications combine their resources into pools that can be assigned on demand to users.
(5) The IPV4 has to reached exhaustion and unable to meet IOT's requirements.Scale can be met only by IPV6 and reuse IPV4 by applying tunneling between them.
(a) (1), (2), (3), (4) (b) (2), (3), (4), (5) (c) (2), (3), (4), (5) (d) None of these

52. If TCP window size is 28000 bytes, maximum segment size is 1400 bytes, received cumulative ACK 135801 and next receives cumulative ACK 140001. Then calculate the number of bytes it now sends.
(a) 2000 (b) 4000 (c) 6000 (d) None of these

53. A router contains, on average, 256 Kbytes of data and average length of a packet is 200 bytes, and that a packet is buffered, on average, 12ms. Then what is the average arrival rate and average delay?
(a) 20 and 10 (b) 30 and 15 (c) 40 and 20 (d) None of these

54. The 88 LEO satellite divided into eight necklaces around the earth. At the altitude they are using, the period is 90 minutes. What is the average interval for handovers (in seconds) for a stationary transmitter?
(a) 960 (b) 970 (c) 971 (d) None of these

55. If 33 MHz of bandwidth is assigned to FDD which uses two 25 kHz simplex channels to provide full duplex voice and control channels then what is the number of channels available per cell if a system uses 3 and 4-cell reuse?
(a) 170, 100 (b) 170, 95 (c) 160, 90 (d) None of these

56. In a RSA cryptosystem if p = 29, q = 31 and plaintext P = 10, then ciphertext C is
(a) 11 (b) 13 (c) 17 (d) None of these

57. Frames of 1000 bits are sent over a 1-Mbps channel with propagation time is 270 msec. What is the maximum achievable channel utilization using sliding window protocol if window size is 3.
(a) 70 % (b) 80 % (c) 90 % (d) None of these

58. What is minimum frame size required for a CSMA/CD protocol running at 1 Gbps on a 300 m cable with a link speed of 3×10^8 m/s and jamming signal is 32 bits ?
(a) 125 bytes (b) 250 bytes (c) 500 bytes (d) None of these

59. Consider the following statements:

S_1: A band limited signal can be reconstructed exactly if it is sampled at a rate atmost twice the maximum frequency component in it.

S_2: An IMAP client synchronizes the e-mail on your computer with the contents of your account on the e-mail server, while a POP account simply downloads the inbox.

S_3: ATM Adaptation Layer 5 uses CRC-16.

S_4: A URI is an identifier for some resource, but a URL gives you specific information as to how we can obtain that resource.

S_5: Most new phones use LTE only for data and rely on GSM or CDMA for voice and texts.

Which of the following options is correct?

(a) S_1, S_2, S_3 (b) S_2, S_3, S_4 (c) S_2, S_3, S_5 (d) None of these

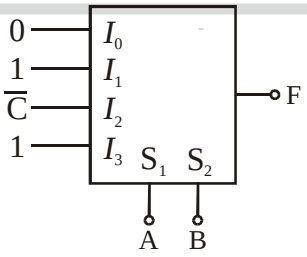
60. Match the following in Lists:

List-1	**List-2**
A. Digital signature	**1.** In 1991, NIST proposed using a variant of the El Gamal public-key algorithm .El Gamal gets its security from the difficulty of computing discrete logarithms, rather than from the difficulty of factoring large numbers.
B. PGP	**2.** Which uses 128-bit keys.
C. Steganography	**3.** It is practiced by those wishing to convey a secret message or code. While there are many legitimate uses, malware developers have also been found to use steganography to obscure the transmission of malicious code.
D. SLA	**4.** This allows the quality of service (QoS) to be benchmarked and, if stipulated by the agreement, rewarded or penalized accordingly.
E. SaaS	**5.** Software delivery and licensing in which software is accessed online via a subscription, rather than bought and installed on individual computers.

(a) $A \to 2, B \to 3, C \to 4, D \to 1, E \to 5$ (b) $A \to 5, B \to 3, C \to 1, D \to 4, E \to 2$

(c) $A \to 4, B \to 1, C \to 5, D \to 2, E \to 3$ (d) None of these

61. The number of minimum terms of the following function F which is implemented by MUX .....



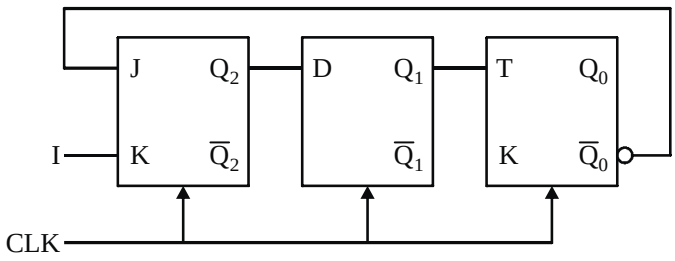
(a) 4 (b) 5 (c) 6 (d) 3

62. The Boolean function can be expressed in canonical SOP and POS forms, so, for $Y = A\overline{B} + B\overline{C}$, the SOP and POS forms will be -

(a) $Y = \sum(0,2,4,6); Y = \pi(1,3,7)$ (b) $Y = \sum(1,2,5,7); Y = \pi(0,3,4,6)$

(c) $Y = \sum(2,4,5,6); Y = \pi(0,1,3,7)$ (d) $Y = \sum(1,2,4,5); Y = \pi(0,3,6)$

63. Consider the following synchronous counter made up of J, K, D, T Flip-Flops.



The modulus value of the counter is

(a) 5 (b) 8 (c) 7 (d) 4

64. F's complement of $(3A\,2\,E\,0)_{15}$ E

(a) C 5 D 1 0 (b) C D D 2 0 (c) B 4 C 1 0 (d) None of these

65. What is the IEEE 754 binary representation of the number $-0.75_{(10)}$? Consider 32 bit word and bias 127.

(a) 10111101010000000100000000100000 (b) 10111111010000000000010000110000

(c) 10111101010000000100000000011000 (d) 10111111010000000000000000000000

66. The Boolean theorem $AB + \overline{A}C + BC = AB + \overline{A}C$ corresponds to

(a) $(A + B) \cdot (\overline{A} + C) \cdot (B + C) = (A + B) \cdot (\overline{A} + C)$

(b) $AB + \overline{A}C + BC = AB + BC$

(c) $AB + \overline{A}C + BC = (A + B) \cdot (\overline{A} + C) \cdot (B + C)$

(d) $(A + B) \cdot (\overline{A} + C) \cdot (B + C) = AB + \overline{A}C$

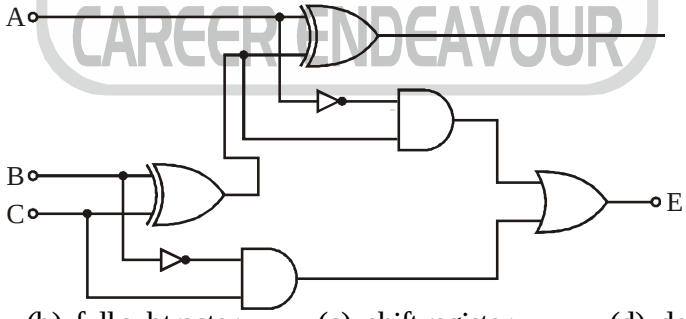
67. How many 2-input multiplexers are required to construct a 2^{10}-input multiplexer ?

(a) 1023 (b) 31 (c) 10 (d) 127

68. In sequential circuits :
S1 : NAND is not associative.
S2 : NOR and NAND are not distributive.
Which statements is/are ***true*** ?

(a) S1 only (b) S2 only (c) Both (d) None of these

69. The circuit shown in the given figure is a



(a) full adder (b) full subtracter (c) shift register (d) decade cousnter

70. Toggle flip-flop, popularly known as T flip-flop. To derive T flip-flop from JK flip-flop :

I : We must have input J = K = 0, the output $Q_{n+1} = Q_n$, i.e., output does not change its state.

II. And for J = K = 1, the output $Q_{n+1} = \overline{Q}_n$, i.e., output toggles.

(a) Only I (b) Only II (c) Both I and II (d) None of these

Space for rough work

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NTA-UGC-NET-COMPUTER SCIENCE & APPLICATIONS

Test Series- A

Date: 18-05-2019

ANSWER KEY

PAPER – I

1. (d)	**2.** (b)	**3.** (c)	**4.** (d)	**5.** (b)
6. (b)	**7.** (a)	**8.** (c)	**9.** (c)	**10.** (a)
11. (b)	**12.** (a)	**13.** (c)	**14.** (c)	**15.** (c)
16. (b)	**17.** (d)	**18.** (a)	**19.** (c)	**20.** (d)

PAPER – II

21. (a)	**22.** (a)	**23.** (b)	**24.** (b)	**25.** (c)
26. (a)	**27.** (c)	**28.** (a)	**29.** (a)	**30.** (a)
31. (d)	**32.** (a)	**33.** (a)	**34.** (a)	**35.** (b)
36. (c)	**37.** (a)	**38.** (d)	**39.** (d)	**40.** (a)
41. (a)	**42.** (b)	**43.** (d)	**44.** (a)	**45.** (a)
46. (a)	**47.** (a)	**48.** (a)	**49.** (b)	**50.** (d)
51. (d)	**52.** (d)	**53.** (d)	**54.** (c)	**55.** (d)
56. (d)	**57.** (d)	**58.** (d)	**59.** (d)	**60.** (d)
61. (b)	**62.** (c)	**63.** (a)	**64.** (c)	**65.** (d)
66. (a)	**67.** (a)	**68.** (c)	**69.** (b)	**70.** (c)