TEST SERIES NTA-UGC-NET/JRF JUNE 2019

BOOKLET SERIES B

Paper Code 87

Test Type: TEST SERIES

COMPUTER SCIENCE & APPLICATIONS

Duration: 01:30 Hours

Date: 22-05-2019

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. Ministry of Human Resource Development (HRD) Includes
   (a) Department of School Education and literacy
   (b) Department of Higher Education
   (c) Both (a) and (b)
   (d) None of these

2. NAAC is an autonomous institution under the aegis of
   (a) ICSSR (b) CSIR (c) AICTE (d) UGC

3. Which of the following are Central Universities?
   1. Rani Lakshmi Bai Central Agricultural University
   2. Baba Saheb Bhimrao Ambedkar University
   3. Dr. Hari Singh Gaur University
   4. Manipur University
   (a) 1, 2 and 4 (b) 1, 3 and 4 (c) 2, 3 and 4 (d) All of these

4. In which year Kothari Commission was appointed?
   (a) 1960 – 65 (b) 1966 – 66 (c) 1966 – 68 (d) None of these

5. First open University in India was
   (a) Dr. B. R. Ambedkar open University (b) Indra Gandhi National Open University
   (c) Delhi University (d) None of these

6. Which of the following higher education institutions got the top rank in India as per the national institutional ranking from work (NIRF), 2019?
   (a) Delhi University (b) IIT Mumbai (c) IIT Madras (d) IIT Delhi

7. In which year Pradhan Mantri Kaushal Vikas Yojana (PMKVY) was lauched by the Govt. of India in all states of India?
   (a) 2016 (b) 2013 (c) 2018 (d) 2015

8. Delhi University is a
   (a) Central University (b) State University (c) Deemed University (d) Cannot say

9. Through which amendment the Government of India incorporated environmental concerns in the Indian constitution?
   (a) 21st amendment (b) 32nd amendment (c) 42nd amendment (d) 51st amendment

10. University having central campus for imparting education are called
    (a) Central Universities (b) Deemed Universities
    (c) Residential Universities (d) Open Universities

11. Grapevine is _____ disadvantageous for an organization.
    (a) Never (b) Always (c) Sometimes (d) Most times

12. Which among the following is not one of the 7 C's of effective Communication?
    (a) Conciseness (b) Courtesy (c) Completeness (d) Calmness

13. "Non-fluencies" are _____.
    (a) Verbal code (b) Non verbal language
    (c) Semantic code (d) Symbolic code

14. Memo is a _____ Communication.
    (a) Formal (b) Informal (c) Grapevine (d) None of these

15. Multiple transfer station can lead to _____.
(a) Smooth transmission of ideas (b) Communication barrier
(c) Effective Communication (d) None of these

16. The primary goal of teaching is to
(a) To inform students
(b) To achieve academic excellence
(c) To brings about socially desirable changes in the students
(d) None of the above

17. Post- Active phase of teaching is
(a) Preparation (b) Actual teaching (c) Evaluation (d) None of these

18. Who among the following is not an Idealist?
(a) Plato (b) Aristotle (c) Hegel (d) Rousseau

19. My Pedagogic Creed is a book written on teaching methods by
(a) Dewey (b) Rousseau (c) Plato (d) Aristotle

20. Pedagogy is
(a) Science of Communication (b) Art and Science of Teaching
(c) Science and Art of Writing (d) Remedial Teaching

PAPER – II

21. Match the problem domains in GROUP-1 with the solution technologies in GROUP-2

Group-1	Group-2
P. COCOMO	1. To improve a particular area of performance or functionality, reduce operational costs or add new elements to a current design.
Q. Version Control	2. To assess agile methods, COSTS integration, or architectural approaches such as service oriented architectures.
R. Agile	3. Modeling technique that defines the features to be implemented and the resolution of any errors that may be encountered.
S. Use cases	4. The allocation of requirements and the design planning and development as executed in a series of increments.
T. Re-engineering	5. To track every individual change by each contributor and helping prevent concurrent work from conflicting.

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

22. Which of the following statements is/are correct?
(1) A software engineer must design the modules with the goal of high cohesion and low coupling.
(2) Usability categorized under Product Operation of McCall's Software Quality Factors.
(3) Spiral Model is consistent with approaches that have multiple software builds and releases which allows making an orderly transition to a maintenance activity.
(4) Web-based systems apply the same levels of formal planning and testing used in software development.
(5) Validation is used to find out whether they meet the specified requirements whereas Verificationis used to determine whether software meets the customer expectations and requirements.
(a) (1), (2), (3) (b) (1), (3), (4) (c) (2), (3), (5) (d) None of these

23. Consider the following statements:

S_1: Crystal is an analytics and reporting software solution for small and medium-sized businesses. It enables deeper insights to business information and positions your organization for greater competitive advantage.

S_2: The basis for requirements elicitation is the knowledge that has been gained during requirements engineering about the system context of the system to be developed, which comprises the requirements sources that are to be analyzed and queried.

S_3: Reduced Process risk is not a benefit of software reuse.

S_4: The architecture of object-oriented software results in a series of layered subsystems that encapsulate collaborating classes.

S_5: Software quality assurance consists of the auditing and reporting functions of management.

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) All of these

24. Compute Cyclomatic complexity of the following code:

```
int Fact (int N){
if (N < 0){
fac = –1
}
else if (N==0 || N==1){
fac = 1
}
else {
fac = N; K = N – 1;
while (k< >0){
fac = fac * k;
k = k – 1
}
}
Fact = fac;
}
```

(a) 5 (b) 6 (c) 7 (d) None of these

25. If mean time to between failure (MTBF) is 400 day then availability was 0.8. Due to complex nature of the software, enhanced version is required having availability 0.9. In this process MTTR (Mean time of repair) increased by 10 days. Compute MTBF of the enhanced version ?

(a) 900 (b) 950 (c) 990 (d) None of these

26. In the software system, if 4000 errors are seeded during code review and 3200 errors are detected.The same test suit detected 40000 non seeded errors. Then compute number undected errors in the software system.

(a) 70000 (b) 80000 (c) 90000 (d) None of these

27. If 600 modules are available in the software. Due to reusable nature of software only 80 % can be reused, rest 20 % would have been developed from starting. If each module has 100 LOC and cost of each LOC 20 $. Then compute risk exposure if risk probability is 09.

(a) 5500$ (b) 60000$ (c) 70000$ (d) None of these

28. In the given software if there are 200 modules are in the current release 10 modules are added, 20 modules are changed and 20 modules are delated. Then calculated software maturity in (SMI)

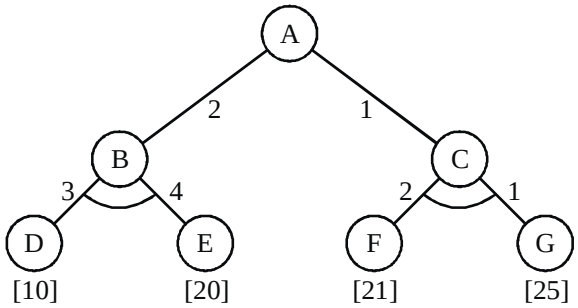
(a) 0.9 (b) 0.95 (c) 0.98 (d) None of these

29. The orthogonal arrow testing has 4 variables. If the strength value of the second variable is fixed then compute the number of test cases and success probability.

(a) 8,0.8 (b) 16,0.9 (c) 20,0.9 (d) None of these

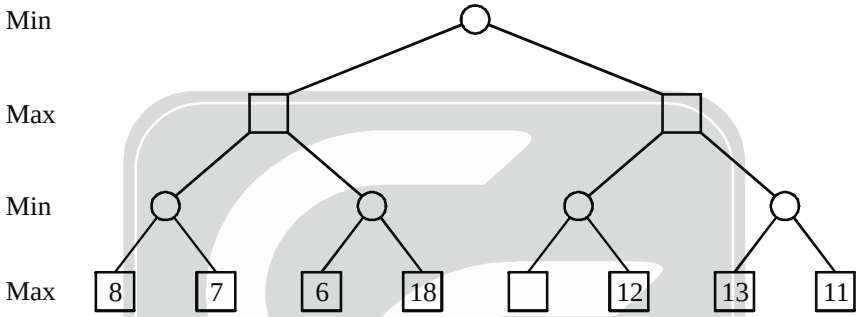
30. If number of input, input control, output, output control parameters are 4, 5, 6, 5. If number of global variables used for respected data and control are 10. If fan-out is 5 and fan-in is 10. Then coupling metric and coupling module complexity are
(a) 0.9, 25 (b) 0.95, 125 (c) 0.9, 125 (d) None of these

31. What will be the solution of this graph using AO*Algo ?



(a) 36 (b) 37 (c) 39 (d) None of these

32. What is the solution of the using max-min algo ?



(a) 7 (b) 13 (c) 6 (d) 1

33. A multiagent is network of software agents that interact to solve problems.
(a) Strongly coupled (b) Loosely coupled (c) Legacy (d) None of these

34. S_1: The task of coming up with a sequence of actions that will achieve a goal is called planning.
S_2: Planners decompose the world into logical conditions and represent a state as a conjugation of positive literals.
Which statement is/are TRUE ?
(a) S_1 only (b) S_2 only (c) S_1 and S_2 (d) None of these

35. Restricted Boltzmann Machine (RBM) is a type of:
(a) Belief Network (b) Autoencoder
(c) Convolutional Neural Network (d) Recurrent Neural Network

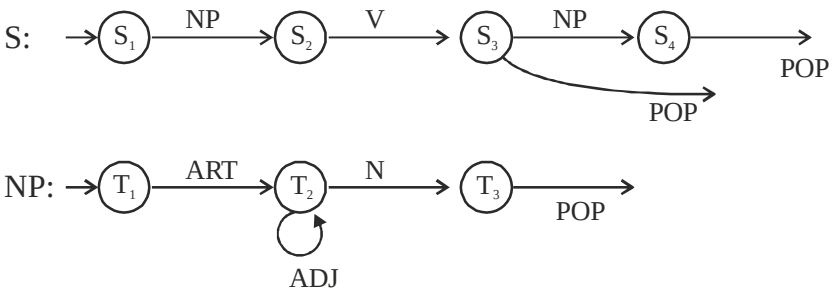
36. For the network shown below, find J(W) for $w_{10} = 0.2$, $w_{20} = 0.05$, $w_{11} = 0.1$, $w_{21} = 0.05$, $w_{12} = 0.15$, $w_{22} = 0.01$, $w_{13} = 0.3$, $w_{23} = 0.03$, $X = [1\ 2\ 3]^T$ and $Y = [1\ 0]^T$
(a) 0 (b) 0.78 (c) 0.61 (d) None of these

37. If $A = (x_1, 0.5), (x_2, 0.1), (x_3, 0.4)$ and $B = (x_1, 0.2), (x_2, 0.3), (x_3, 0.5)$. Then $A \cup B$
(a) $(x_1, 0.5), (x_2, 0.1), (x_3, 0.4)$ (b) $(x_1, 0.5), (x_2, 0.3), (x_3, 0.5)$
(c) $(x_1, 0.2), (x_2, 0.3), (x_3, 0.5)$ (d) None of these

38. What are the applications of Fuzzy Inference Systems?
(a) Wireless services, heat control and printers
(b) Restrict power usage, telephone lines and sort data
(c) Simulink, boiler and CD recording
(d) Automatic control, decision analysis and data classification

39. *x* is A then *y* is B else *y* is C .The output of the given fuzzy rule is
(a) a fuzzy set (b) a crisp set (c) a fuzzy relation (d) a membership function

40. Consider the following RTN



Which of the following sentence can not be parsed by above RTN?
(a) A boy push the door (b) The girl sings a song
(c) The boy is sitting on the table (d) A boy comes

41. Consider a CPU, where all the instructions required 6 clock cycles to complete their execution. Under the instruction set there are 215 instructions and a total of 125 control signals are needed to be generated by the control unit. While designing the horizontal micro-programmed control unit, single address field format is used for branch control logic.
What is the minimum size of control word and control address register.
(a) 125, 11 (b) 7, 12 (c) 7, 11 (d) 125, 12

42. A computer system has a cache with access time 10 ns, a hit ratio of 80% and average memory access time is 20 ns. Then what is the access time for physical memory?
(a) 50 ns (b) 40 ns (c) 30 ns (d) 20 ns

43. A computer uses 1 GB of main memory suppose the memory is word organized and the word size is 64 bits. Then the number of address lines required to connect the memory with the computer is
(a) 27 (b) 28 (c) 29 (d) 30

44. Consider a scenario where a non-pipelined processor has a clock rate of 5 GHz which has a average CPI of 5. An upgrade to the processor includes a 5-stage pipeline where the clock rate is 3 GHz. What is the speed-up achieved by using upgrated processor?
(a) 3.03 (b) 4.02 (c) 4.62 (d) 2.34

45. In a vectored interrupt :
(a) the interrupting device supplies the branch information to the processor through an interrupt vector.
(b) the CPU does no know, which device cause the interrupt without polling each I/O interface.
(c) the branch address is always assigned to a fixed location in memory
(d) None of the above

46. Cache Memory and Main Memory are divided into equal size Blocks with 16 words. Cache Memory has 512 blocks and Main Memory has 4096 blocks; Cache is designed with Direct Mapped, the number of tag bits is
(a) 2 (b) 3 (c) 5 (d) None of these

47. Suppose that a processor has access to three levels of memory. Level 1 contain 2000 words and has an access time of 0.02 msec. Level 2 contain 10,000 words and has an access time of 0.2 msec. Level 3 contains 20,000 words and has an access time of 2 msec. Assume that if a word to be accessed is in level 1, then processor access it directly. If it is in level 2 the word is first transferred to L_1 and then accessed by the processor. Similarly for L3 the word is transferred to L2 then to L1 and then accessed. The hit ratio for level 1 is 0.65 and for level 2 is 0.45. What is the average access time (in %)?
(a) 23.23 (b) 47.5 (c) 13.11 (d) 42.95

48. Assume an instruction pipeline consists of 3 stages. F (Fetch), D (Decode), E (execute). If different numbers of clock cycles required are as follows, what is the utilization factor?

I	F	D	E
1	1	2	3
2	2	3	3
3	1	2	4
4	2	2	3

(a) 57% (b) 25% (c) 55% (d) 43%

49. Which of the following statements are true or false, map them to correct option respectively?
I. Theoretically, the maximum achievable speed up is equal to number of stages in a pipelined system.
II. Pipelining improves the CPU throughout as well as reduces the execution time of each individual instruction.
III. Operand forwarding technique helps reduce the memory or cycle stalls in pipelined architecture.
IV. The branch penalty is inversely proportional to the pipeline depth.
(a) T T T T (b) T F T F (c) T T T F (d) F T F F

50. Consider a hypothetical computer that has fixed number of operations and addresses (memory). Given that there are 512 operation codes and 256K memory addresses, then calculate the number of bits that would be required for zero, single and two address instruction respectively?
(a) 9, 9, 9 (b) 9, 17, 25 (c) 17, 27, 35 (d) 9, 27, 45

51. S_1: Fork( ) is a system call to used to create child process.
S_2: Fork( ) returns, positive (Process Id of a child process) to the parent process.
S_3: Parent and child process will have same virtual address, but physical address will be different, after fork() system call.
Which statement is/are TRUE ?
(a) S_1, S_2 (b) S_2, S_3 (c) S_1, S_3 (d) All of these

52. Match the following Lists:

List-1	**List-2**
P. Privilized instructions	1. Set the time of a clock
Q. Non-privilized instruction	2. Disabling the interrupts
R. Privilized instruction	3. Reading the status of the processor
S. Non-privilized instruction	4. Reading the time of a clock

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

53. Match the following Lists:

List-1	**List-2**
P. LTS	1. Responsible for selecting one of the process in the ready state for scheduling onto running state.
Q. STS	2. Creating and bringing the new process into the system.
R. MTS	3. Loading the selected job onto CPU.
S. Dispatcher	4. It is responsible of suspending and resuming process.

(a) P-1, Q-2, R-3, S-4 (b) P-2, Q-1, R-4, S-3
(c) P-3, Q-1, R-2, S-4 (d) P-1, Q-2, R-4, S-3

54. Consider the process instance of a CPU having priority algo with pre-emptive algo. What will be the ratio of Avg T.A.T to Avg W.T. ?

Priority	Process_No	A.T.	B.T.
4	1	1	4
5	2	2	2
7	3	2	3
8	4	3	5
5	5	3	1
6	6	4	2

(a) 62 : 45 (b) 65 : 40 (c) 63 : 43 (d) None of these

55. **Process P_0 code**

```
while (true)
{
    while (turn ! = 0);
    C.S
    turn = 1;
}
```

Process P_1 code

```
while (true)
{
    while (turn ! = 1);
    C.S
    turn = 0;
}
```

Process takes "turn" to enter into C.S. based on code we can say

(i) Mutual exclusion satisfied. (ii) Progress is not satisfied.

For deadlock condition, which statement is/are TRUE ?

(a) (i) only (b) (ii) only (c) Both (i) and (ii) (d) None of these

56. Related to address binding, three statements are given:

(i) If the compiler is responsible for association of program, instruction and data to actual physical memory locations, then it is called as compile time address binding.

(ii) If the O.S. memory manager is responsible for address binding and this type of address binding will be done after leading the program into memory it is called "load time address binding".

(iii) If the address will be postponeded even after loading the program into memory, it is known as dynamic address binding.

Which statement is/are TRUE ?

(a) (i) and (ii) (b) (iii) only (c) (i) and (iii) (d) All of these

57. Assume a system using segmented paging architecture, where segment is divided into 8 K pages and each page is having 2 K entries the memory is byte addressable. Segment requires 17 bits to represent all the segments of L.A.S. Physical address system is 512 KB. What will be length of L.A, P.A. ?

(a) 41, 19 (b) 32, 19 (c) 24, 19 (d) 17, 19

58. Using the optimal page replacement algo. In the system where initially 4 frames are empty. Find out the number of page fault for the following access request ?

7, 0, 1, 2, 0, 3, 0, 4, 2, 3, 0, 3, 2, 1, 2, 0, 1, 7, 0, 1

(a) 9 (b) 10 (c) 8 (d) None of these

59. Corresponding to "Disk space allocation method"

(i) In continuous allocation, every file is associated with 2 parameters : starting disk block address and size.

(ii) In linked allocation (non contiguous) every file is associated with 2 parameters : starting DBA, ending DBA.

(iii) In indexed allocation; every file is associated with its own index node. Index contain all the disk block address of the file.

Which statement is/are TRUE ?

(a) (i) and (ii) (b) (ii) and (iii) (c) (iii) and (iv) (d) All of these

60. Which one is not a program threats:

(i) Trojan horse (ii) Trap door (iii) Logic bomb (iv) Stack and buffer overflow

(a) (i) only (b) (ii) and (iii) (c) (iv) only (d) None of these

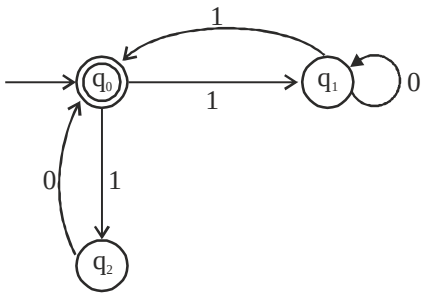
61. Which of the following is/are the most general phase structure grammar

(I) Context-sensitive (II) Context-free (III) Regular

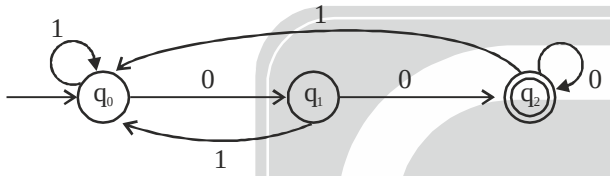
(a) I and II (b) II and III (c) Only I (d) All of the above

62. Match the following

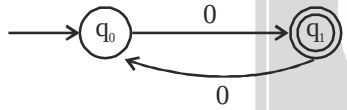
Column-I **Column-II**

(A) 

(I) $(00)0^*$

(B) 

(II) $\left(10+10^*1\right)^*$

(C) 

(III) $(0+1)^*00$

Codes:

	A	B	C
(a)	I	II	III
(b)	II	III	I
(c)	III	II	I

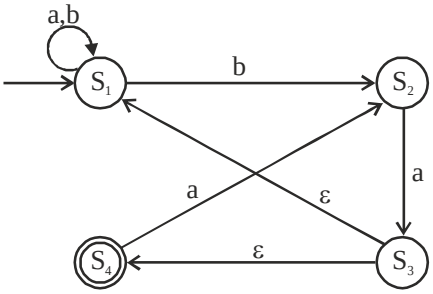
(d) None of these

63. Let us consider the following, $L_1=(0+1)^*$; $L_2=\left\{\omega\in(0,1)^* \mid \omega=\omega^R\right\}$

What is the union of L_1 and L_2

(a) L_1 (b) L_2 (c) $(0+1)^+$ (d) None of these

64. Consider the following non-deterministic automaton, where S_1 is the start and S_4 is the final (accepting) state. The alphabet is {a, b}. A transition with table $(\in)$ can be taken without consuming any symbol from the input



Which of the following regular expressions corresponds to the language accepted by this automation?

(a) $(a+b)^*aba$ (b) $(a+b)^*ba^*$ (c) $(a+b)^*ba(aa)^*$ (d) $(a+b)^*$

65. **Match the following:**

Column-I	**Column-II**
(A) Code generation	(I) type checking
(B) Semantic analysis	(II) Parser
(C) A part of a compiler that is responsible for recognizing syntax.	(III) Pushdown automation
(D) Expression evaluation	(IV) Post-order traversal

Codes:

	A	**B**	**C**	**D**
(a)	III	I	II	IV
(b)	III	I	IV	II
(c)	III	IV	I	II
(d)	I	II	III	IV

66. Construct LL(1) parsing table for the following grammar. Find the follow of T' and F.

$E \to T\ E'$; $E \to \in / +TE'$; $T \to FT'$

$T' \to \in / *FT'$; $F \to id / (E)$

(a) $\{+,),\$\}, \{*,+,(,\$\}$ (b) $\{),\$\}\{\in,+\}$

(c) $\{*,+,(,\$\}\{+,\$\}$ (d) None of these

67. Which of the following statement is TRUE?

(a) Every C.F.G. in C.N.F. can be converted into equivalent grammar in G.N.F.

(b) A C.F.G. grammar is C.N.F. can generate a string ω of length ATMOST 2^{i-1} if the height of derivation tree is i.

(c) If C.F.G. in G.N.F. is also a s-grammar

(d) All of the above

68. Which of the following is decidable

(a) Ambiguity problem is C.F.G.

(b) Membership problem of C.F.G.

(c) Inherent ambiguity problem of C.F.G.

(d) For a given C.F.G. G weather G is regular

69. Consider the following language

L_1 = The set of all binary string whose 10^{th} symbol from the end is 1

L_2 = The set of all binary string whose 5^{th} symbol from the begining is 0.

A = minimum number of states in D.F.A. accepting L_1

B = minimum number of states in D.F.A. accepting L_2

Then A + B = ?

(a) 1027 (b) 1031 (c) 1050 (d) None of the above

70. Consider the following statements

S_1 : the minimal N.F.A. is always unique

S_2 : the N.F.A. with n states has an equivalent N.F.A. with n + 2 states.

S_3 : the D.F.A. having all states as final states accepts Σ^*

S_4 : the N.D.F.A having all states as final states may not accepts Σ^*

Which of the above statement is TRUE

(a) S_1, S_2 only (b) S_2, S_3 only (c) S_2, S_3, S_4 only (d) All S_1, S_2, S_3, S_4

Space for rough work

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Test Series- B

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ANSWER KEY

PAPER – I

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

PAPER – II

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