

**UGC NET PAPER 2 NOVEMBER 05, 2017 SHIFT 1 COMPUTER SCIENCE AND APPLICATIONS QUESTION PAPER**

**Note :** This paper contains fifty (50) objective type questions of two (2) marks each. All questions are compulsory.

1. If the time is now 4 O'clock, what will be the time after 101 hours from now ?  
 (1) 9 O'clock      (2) 8 O'clock      (3) 5 O'clock      (4) 4 O'clock

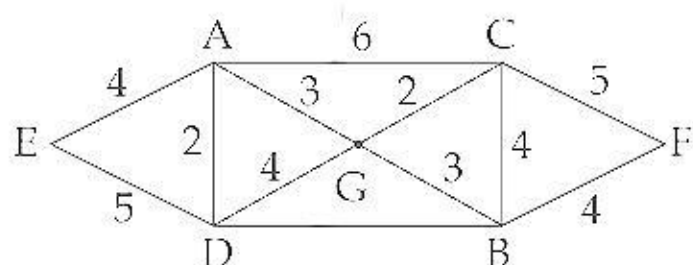
2. Let  $m = (313)_4$  and  $n = (322)_4$ . Find the base 4 expansion of  $m + n$ .  
 (1)  $(635)_4$       (2)  $(32312)_4$       (3)  $(21323)_4$       (4)  $(1301)_4$

3. Let  $A = \begin{bmatrix} 1 & 1 & 0 \\ 0 & 1 & 0 \\ 1 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$  and  $B = \begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 1 & 0 \\ 1 & 0 & 1 & 1 \end{bmatrix}$  Find the boolean product  $A \cdot B$  of the two matrices.

- (1)  $\begin{bmatrix} 1 & 1 & 1 & 0 \\ 0 & 1 & 1 & 0 \\ 1 & 1 & 1 & 0 \\ 1 & 0 & 1 & 1 \end{bmatrix}$       (2)  $\begin{bmatrix} 1 & 1 & 0 & 1 \\ 0 & 1 & 0 & 1 \\ 1 & 1 & 1 & 0 \\ 1 & 0 & 1 & 1 \end{bmatrix}$       (3)  $\begin{bmatrix} 1 & 1 & 0 & 1 \\ 0 & 1 & 1 & 0 \\ 1 & 1 & 1 & 0 \\ 1 & 0 & 1 & 1 \end{bmatrix}$       (4)  $\begin{bmatrix} 1 & 1 & 1 & 0 \\ 0 & 1 & 1 & 0 \\ 1 & 0 & 1 & 1 \\ 1 & 0 & 1 & 1 \end{bmatrix}$

4. How many distinguishable permutations of the letters in the word BANANA are there ?  
 (1) 720      (2) 120      (3) 60      (4) 360

5. Consider the graph given below :



Use Kruskal's algorithm to find a minimal spanning tree for the graph. The List of the edges of the tree in the order in which they are chosen is ?

- (1) AD, AE, AG, GC, GB, BF      (2) GC, GB, BF, GA, AD, AE  
 (3) GC, AD, GB, GA, BF, AE      (4) AD, AG, GC, AE, GB, BF

6. The Boolean function with the Karnaugh map

		AB			
		00	01	11	10
CD	00	0	1	1	0
	01	0	1	1	1
	11	1	1	1	1
	10	0	1	1	0

is :

- (1)  $(A + C).D + B$                       (2)  $(A + B).C + D$   
(3)  $(A + D).C + B$                       (4)  $(A + C).B + D$

7. The Octal equivalent of the binary number 1011101011 is :

- (1) 7353                      (2) 1353                      (3) 5651                      (4) 5657

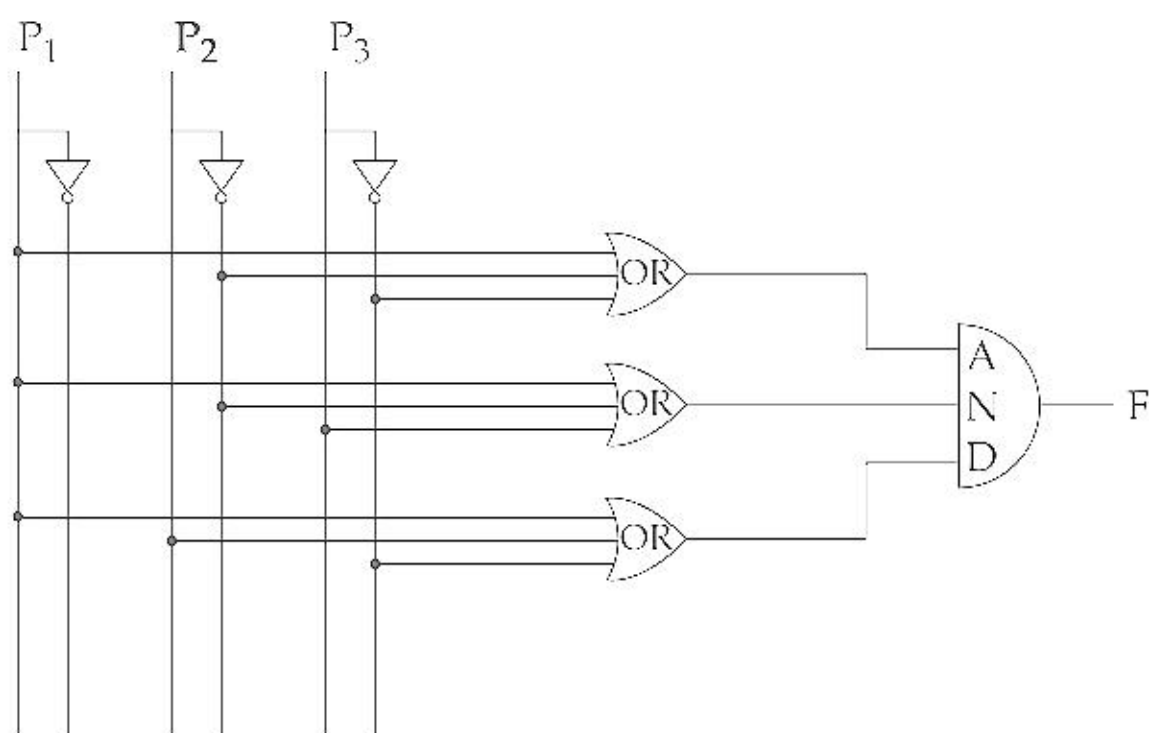
8. Let P and Q be two propositions,  $\neg (P \leftrightarrow Q)$  is equivalent to :

- (1)  $P \leftrightarrow \neg Q$                       (2)  $\neg P \leftrightarrow Q$                       (3)  $\neg P \leftrightarrow \neg Q$                       (4)  $Q \rightarrow P$

9. Negation of the proposition  $\exists x H(x)$  is :

- (1)  $\exists x \neg H(x)$                       (2)  $\forall x \neg H(x)$                       (3)  $\forall x H(x)$                       (4)  $\neg x H(x)$

10. The output of the following combinational circuit is F.



The value of F is :

- (1)  $P_1 + P_2'P_3$                       (2)  $P_1 + P_2'P_3'$                       (3)  $P_1 + P_2P_3'$                       (4)  $P_1' + P_2P_3$

11. 'ptrdata' is a pointer to a data type. The expression \*ptrdata++ is evaluated as (in C++) :
- (1) \*(ptrdata++)                                   (2) (\*ptrdata)++  
 (3) \*(ptrdata)++                               (4) Depends on compiler
12. The associativity of which of the following operators is Left to Right, in C++ ?
- (1) Unary Operator                               (2) Logical not  
 (3) Array element access                       (4) addressof
13. A member function can always access the data in \_\_\_\_\_, (in C++).
- (1) the class of which it is member           (2) the object of which it is a member  
 (3) the public part of its class               (4) the private part of its class
14. Which of the following is **not** correct for virtual function in C++ ?
- (1) Must be declared in public section of class.  
 (2) Virtual function can be static.  
 (3) Virtual function should be accessed using pointers.  
 (4) Virtual function is defined in base class.
15. Which of the following is **not** correct (in C++) ?
- (1) Class templates and function templates are instantiated in the same way.  
 (2) Class templates differ from function templates in the way they are initiated.  
 (3) Class template is initiated by defining an object using the template argument.  
 (4) Class templates are generally used for storage classes.
16. Which of the following is/are **true** with reference to 'view' in DBMS ?
- (a) A 'view' is a special stored procedure executed when certain event occurs.  
 (b) A 'view' is a virtual table, which occurs after executing a pre-compiled query.
- Code :**
- (1) Only (a) is true                               (2) Only (b) is true  
 (3) Both (a) and (b) are true                 (4) Neither (a) nor (b) are true
17. In SQL, \_\_\_\_\_ is an Aggregate function.
- (1) SELECT                                       (2) CREATE                                       (3) AVG   (4) MODIFY

18. Match the following with respect to RDBMS :

- |                           |   |
|---------------------------|---|
| (a) Entity integrity      | (i) enforces some specific business rule that do not fall into entity or domain |
| (b) Domain integrity      | (ii) Rows can't be deleted which are used by other records                      |
| (c) Referential integrity | (iii) enforces valid entries for a column                                       |
| (d) Userdefined integrity | (iv) No duplicate rows in a table   |

Code :

- |     | (a)   | (b)   | (c)   | (d)  |
|-----|-------|-------|-------|------|
| (1) | (iii) | (iv)  | (i)   | (ii) |
| (2) | (iv)  | (iii) | (ii)  | (i)  |
| (3) | (iv)  | (ii)  | (iii) | (i)  |
| (4) | (ii)  | (iii) | (iv)  | (i)  |

19. In RDBMS, different classes of relations are created using \_\_\_\_\_ technique to prevent modification anomalies.

- |                             |                    |
|-----------------------------|--------------------|
| (1) Functional Dependencies | (2) Data integrity |
| (3) Referential integrity   | (4) Normal Forms   |

20. \_\_\_\_\_ SQL command changes one or more fields in a record.

- |             |            |            |            |
|-------------|------------|------------|------------|
| (1) LOOK-UP | (2) INSERT | (3) MODIFY | (4) CHANGE |
|-------------|------------|------------|------------|

21. Consider an array representation of an  $n$  element binary heap where the elements are stored from index 1 to index  $n$  of the array. For the element stored at index  $i$  of the array ( $i \leq n$ ), the index of the parent is :

- |                         |                           |
|-------------------------|---------------------------|
| (1) floor $((i + 1)/2)$ | (2) ceiling $((i + 1)/2)$ |
| (3) floor $(i/2)$       | (4) ceiling $(i/2)$       |

22. The following numbers are inserted into an empty binary search tree in the given order : 10, 1, 3, 5, 15, 12, 16. What is the height of the binary search tree ?

- |       |       |       |       |
|-------|-------|-------|-------|
| (1) 3 | (2) 4 | (3) 5 | (4) 6 |
|-------|-------|-------|-------|

23. Let  $G$  be an undirected connected graph with distinct edge weight. Let  $E_{\max}$  be the edge with maximum weight and  $E_{\min}$  the edge with minimum weight. Which of the following statements is false ?

- (1) Every minimum spanning tree of  $G$  must contain  $E_{\min}$ .
- (2) If  $E_{\max}$  is in minimum spanning tree, then its removal must disconnect  $G$ .
- (3) No minimum spanning tree contains  $E_{\max}$ .
- (4)  $G$  has a unique minimum spanning tree.

24. A list of  $n$  strings, each of length  $n$ , is sorted into lexicographic order using merge - sort algorithm. The worst case running time of this computation is :
- (1)  $O(n \log n)$       (2)  $O(n^2 \log n)$       (3)  $O(n^2 + \log n)$       (4)  $O(n^3)$
25. Postorder traversal of a given binary search tree  $T$  produces following sequence of keys :  
3, 5, 7, 9, 4, 17, 16, 20, 18, 15, 14  
Which one of the following sequences of keys can be the result of an in-order traversal of the tree  $T$  ?
- (1) 3, 4, 5, 7, 9, 14, 20, 18, 17, 16, 15  
(2) 20, 18, 17, 16, 15, 14, 3, 4, 5, 7, 9  
(3) 20, 18, 17, 16, 15, 14, 9, 7, 5, 4, 3  
(4) 3, 4, 5, 7, 9, 14, 15, 16, 17, 18, 20
26. Which of the following devices takes data sent from one network device and forwards it to the destination node based on MAC address ?
- (1) Hub      (2) Modem      (3) Switch      (4) Gateway
27. \_\_\_\_\_ do not take their decisions on measurements or estimates of the current traffic and topology.
- (1) Static algorithms      (2) Adaptive algorithms  
(3) Non - adaptive algorithms      (4) Recursive algorithms
28. The number of bits used for addressing in Gigabit Ethernet is \_\_\_\_\_.
- (1) 32 bits      (2) 48 bits      (3) 64 bits      (4) 128 bits
29. Which of the following layer of OSI Reference model is also called end-to-end layer ?
- (1) Network layer      (2) Datalink layer      (3) Session layer      (4) Transport layer
30. The IP address \_\_\_\_\_ is used by hosts when they are being booted.
- (1) 0.0.0.0      (2) 1.0.0.0      (3) 1.1.1.1      (4) 255.255.255.255
31. Consider the following program fragment in assembly language :
- ```

mov ax, 0h
mov cx, 0Ah
doloop :
    dec ax
    loop doloop

```
- What is the value of  $ax$  and  $cx$  registers after the completion of the `doloop` ?
- (1)  $ax = \text{FFF5 h}$  and  $cx = 0 \text{ h}$       (2)  $ax = \text{FFF6 h}$  and  $cx = 0 \text{ h}$   
(3)  $ax = \text{FFF7 h}$  and  $cx = 0A \text{ h}$       (4)  $ax = \text{FFF5 h}$  and  $cx = 0A \text{ h}$

32. Consider the following assembly program fragment :

```

stc
mov al, 11010110b

mov cl, 2

rcl al, 3

rol al, 4

shr al, cl

mul cl

```

The contents of the destination register ax (in hexadecimal) and the status of Carry Flag (CF) after the execution of above instructions, are :

- (1) ax = 003CH; CF = 0                      (2) ax = 001EH; CF = 0  
(3) ax = 007BH; CF = 1                      (4) ax = 00B7H; CF = 1

33. Which of the following regular expressions, each describing a language of binary numbers (MSB to LSB) that represents non-negative decimal values, does **not** include even values ?

- (1)  $0^*1^+0^*1^*$               (2)  $0^*1^*0^+1^*$               (3)  $0^*1^*0^*1^+$               (4)  $0^+1^*0^*1^*$

Where {+, \*} are quantification characters.

34. Which of the following statements is/are TRUE ?

- (a) The grammar  $S \rightarrow SS \mid a$  is ambiguous. (Where S is the start symbol)  
(b) The grammar  $S \rightarrow 0S1 \mid 01S \mid \epsilon$  is ambiguous. (The special symbol  $\epsilon$  represents the empty string) (Where S is the start symbol)  
(c) The grammar (Where S is the start symbol)

$$S \rightarrow T/U$$

$$T \rightarrow x S y \mid xy \mid \epsilon$$

$$U \rightarrow yT$$

generates a language consisting of the string  $yxy/y$ .

- (1) Only (a) and (b) are TRUE.              (2) Only (a) and (c) are TRUE.  
(3) Only (b) and (c) are TRUE.              (4) All of (a), (b) and (c) are TRUE.

35. Match the description of several parts of a classic optimizing compiler in List - I, with the names of those parts in List - II :

| List - I                                                                                                                                                           | List - II              |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|
| (a) A part of a compiler that is responsible for recognizing syntax.                                                                                               | (i) Optimizer          |
| (b) A part of a compiler that takes as input a stream of characters and produces as output a stream of words along with their associated syntactic categories.     | (ii) Semantic Analysis |
| (c) A part of a compiler that understand the meanings of variable names and other symbols and checks that they are used in ways consistent with their definitions. | (iii) Parser           |
| (d) An IR-to-IR transformer that tries to improve the IR program in some way (Intermediate Representation).                                                        | (iv) Scanner           |

Code :

|     | (a)   | (b)   | (c)   | (d)   |
|-----|-------|-------|-------|-------|
| (1) | (iii) | (iv)  | (ii)  | (i)   |
| (2) | (iv)  | (iii) | (ii)  | (i)   |
| (3) | (ii)  | (iv)  | (i)   | (iii) |
| (4) | (ii)  | (iv)  | (iii) | (i)   |

36. In Distributed system, the capacity of a system to adapt the increased service load is called

(1) Tolerance            (2) Scalability            (3) Capability            (4) Loading

37. In \_\_\_\_\_ disk scheduling algorithm, the disk head moves from one end to other end of the disk, serving the requests along the way. When the head reaches the other end, it immediately returns to the beginning of the disk without serving any requests on the return trip.

(1) LOOK            (2) SCAN            (3) C - LOOK            (4) C - SCAN

38. Suppose there are six files F1, F2, F3, F4, F5, F6 with corresponding sizes 150 KB, 225 KB, 75 KB, 60 KB, 275 KB and 65 KB respectively. The files are to be stored on a sequential device in such a way that optimizes access time. In what order should the files be stored ?

(1) F5, F2, F1, F3, F6, F4            (2) F4, F6, F3, F1, F2, F5  
 (3) F1, F2, F3, F4, F5, F6            (4) F6, F5, F4, F3, F2, F1

39. Which module gives control of the CPU to the process selected by the short - term scheduler ?
- (1) Dispatcher      (2) Interrupt      (3) Scheduler      (4) Threading
40. Two atomic operations permissible on Semaphores are \_\_\_\_\_ and \_\_\_\_\_ .
- (1) wait, stop      (2) wait, hold      (3) hold, signal      (4) wait, signal
41. Software does not wear-out in the traditional sense of the term, but software does tend to deteriorate as it evolves, because :
- (1) Software suffers from exposure to hostile environments.  
(2) Defects are more likely to arise after software has been used often.  
(3) Multiple change requests introduce errors in component interactions.  
(4) Software spare parts become harder to order.
42. Software re-engineering is concerned with :
- (1) Re-constructing the original source code from the existing machine (low - level) code program and modifying it to make it more user - friendly.  
(2) Scrapping the source code of a software and re-writing it entirely from scratch.  
(3) Re-organising and modifying existing software systems to make them more maintainable.  
(4) Translating source code of an existing software to a new machine (low - level) language.
43. Which of the following is **not** a key issue stressed by an agile philosophy of software engineering ?
- (1) The importance of self-organizing teams as well as communication and collaboration between team members and customers.  
(2) Recognition that change represents opportunity.  
(3) Emphasis on rapid delivery of software that satisfies the customer.  
(4) Having a separate testing phase after a build phase.



44. What is the normal order of activities in which traditional software testing is organized ?

- (a) Integration Testing
- (b) System Testing
- (c) Unit Testing
- (d) Validation Testing

**Code :**

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

45. Which of the following testing techniques ensures that the software product runs correctly after the changes during maintenance ?

- (1) Path Testing
- (2) Integration Testing
- (3) Unit Testing
- (4) Regression Testing

46. Which of the following Super Computers is the fastest Super Computer ?

- (1) Sun-way TaihuLight
- (2) Titan
- (3) Piz Daint
- (4) Sequoia

47. Which of the following statements about ERP system is true ?

- (1) Most ERP software implementations fully achieve seamless integration.
- (2) ERP software packages are themselves combinations of separate applications for manufacturing, materials, resource planning, general ledger, human resources, procurement and order entry.
- (3) Integration of ERP systems can be achieved in only one way.
- (4) An ERP package implemented uniformly throughout an enterprise is likely to contain very flexible connections to allow changes and software variations.

48. Which of the following is **not** a Clustering method ?
- (1) K - Mean method                      (2) Self Organizing feature map method  
(3) K - nearest neighbor method      (4) Agglomerative method
49. Which of the given wireless technologies used in IoT, consumes the least amount of power ?
- (1) Zigbee                      (2) Bluetooth                      (3) Wi-Fi                      (4) GSM/CDMA
50. Which speed up could be achieved according to Amdahl's Law for infinite number of processes if 5% of a program is sequential and the remaining part is ideally parallel ?
- (1) Infinite                      (2) 5                      (3) 20                      (4) 50

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