



K20P 0788

Reg. No. :

Name :

Ph.D. Entrance Examination, 2020-21
Part – B : INFORMATION TECHNOLOGY/COMPUTER SCIENCE

Time : 70 Minutes

Max. Marks : 50

SECTION – A

Answer **all** questions. **Each** question carries **one** mark : **(20×1=20)**

1. $P \rightarrow (Q \rightarrow R)$ is equivalent to
 - A) $(P \wedge Q) \rightarrow R$
 - B) $(P \vee Q) \rightarrow R$
 - C) $(P \vee Q) \rightarrow \neg R$
 - D) None of the above
2. An urn B_1 contains 2 white and 3 black chips and another urn B_2 contains 3 white and 4 black chips. One urn is selected at random and a chip is drawn from it. If the chip drawn is found black, find the probability that the urn chosen was B_1 .
 - A) $\frac{4}{7}$
 - B) $\frac{3}{7}$
 - C) $\frac{20}{41}$
 - D) $\frac{21}{41}$
3. The assembler directive EQU, when used in the instruction : Sum EQU 200 does
 - A) Finds the first occurrence of sum and assigns value 200 to it
 - B) Replaces every occurrence of sum with 200
 - C) Re-assigns the address of sum by adding 200 to its original address
 - D) Assigns 200 bytes of memory starting the location of sum
4. To guarantee the detection of up to 5 errors in all cases, the minimum Hamming distance in a block code must be
 - A) 4
 - B) 5
 - C) 6
 - D) 8
5. _____ solid representation take advantage of spatial coherence to reduce the storage representations.
 - A) Sweep
 - B) Octree
 - C) Polygon
 - D) CSG

P.T.O.



6. For a cubic Bezier curve, Bernstein polynomials is defined as _____, where i is the control point to be weighted and n is the degree of the curve.
- A) $B_{i,n}(u) = \binom{n}{i} u^i (1-u)^{n-i}$ B) $B_{i,n}(u) = \binom{i}{n} n^u (1-n)^{u-i}$
C) $B_{i,n}(u) = \binom{n}{i} u^i (1+u)^{n+i}$ D) $B_{i,n}(u) = \binom{i}{n} n^u (1+n)^{u+i}$
7. Property of DBMS which ensures execution of all operations in transaction or none of operation is executed is classified as
- A) Isolation property B) Atomicity property
C) Consistency D) Durability
8. In a data warehouse, the star schema is composed of _____ fact table.
- A) One B) Two
C) Three D) Four
9. Part of a program where the shared memory is accessed and which should be executed indivisibly, is called
- A) Semaphores B) Directory
C) Critical section D) Mutual exclusion
10. A system has 6 identical resources and N processes competing for them. Each process can request at most 2 resources. Which one of the following values of N could lead to a deadlock ?
- A) 1 B) 2 C) 3 D) 4
11. Cyclomatic complexity is given by
- A) $V(G) = E - N + 2$ B) $V(G) = E - N$
C) $V(G) = E - N - 2$ D) $V(G) = E + N$
12. When elements of module are grouped together that are executed sequentially in order to perform a task, is called
- A) Procedural cohesion B) Logical cohesion
C) Emporal cohesion D) Co-incidental cohesion



13. A B-tree of order 4 is built from scratch by 10 successive insertions. What is the maximum number of node splitting operations that may take place ?
A) 3 B) 4 C) 5 D) 6
14. A binary search tree in which the nodes have been inserted in the following order : 60, 55, 95, 40, 30, 100, 35 the node with the value 47 will be inserted to the
A) Right of node with value 40 B) Right of node with value 55
C) Right of node with value 35 D) Left of node with value 30
15. Which of the following is not a context free language ?
A) $L = \{a^n b^{m+k} \mid n, m, k \geq 0\}$
B) $L = \{a^n b^{m+k} \mid n, m, k \leq 0\}$
C) $L = \{a^n b^m \mid n, m \geq 0, m \text{ is prime}\}$
D) $L = \{a^n b^m \mid n, m \geq 0\}$
16. $S \rightarrow (S) \mid a$, let the number of states in SLR(1), LR(1) and LALR(1) parsers for the grammar n_1 , n_2 and n_3 respectively
A) $n_1 < n_2 < n_3$ B) $n_1 = n_3 < n_2$
C) $n_1 = n_2 = n_3$ D) $n_1 \leq n_3 \leq n_2$
17. Which protocol uses distance vector routing ?
A) OSPF B) BGP C) RIP D) PPP
18. When a data is transmitted from device A to device B, the header from A's layer 5 is read by B's
A) Physical layer B) Transport layer
C) Session layer D) Presentation layer
19. A Horn clause with no positive literal is sometimes called
A) Definite clause B) Indefinite clause
C) Goal clause D) Infinite clause
20. A 4-input neuron has weights 1, 2, 3 and 4. The transfer function is linear with the constant of proportionality being equal to 2. The inputs are 4, 10, 5 and 20 respectively. The output will be
A) 238 B) 76 C) 119 D) 123



SECTION – B

Answer **any six** questions. **Each** question carries **five** marks : (6×5=30)

1. Illustrate Hamiltonian circuits with suitable example.
 2. Explain the 3D geometrical transform. Explain its characteristics.
 3. Discuss memory management in operating systems.
 4. Explain BFS of a tree with an example.
 5. Differentiate between P and NP class problems.
 6. Define CFG. Construct the CFG for the following :
 $L = \{a^n b^m c^k \text{ where } k = m + n, m, n, k \geq 0\}$.
 7. What are the differences between Finite automata and PDA ? Explain with examples.
 8. Differentiate between the GSM and CDMA mobile technology.
-

**K19P 0571**

Reg. No. :

Name :

Ph.D. Entrance Examination, 2019
Part – B : COMPUTER SCIENCE

Time : 70 Minutes

Max. Marks : 50

SECTION – A

Answer **all** questions. **Each** question carries **one** mark. **(20×1=20)**

1. The bit strings for the sets are 1111100000 and 1010101010. The union of these sets is
 - a) 1010100000
 - b) 1010101101
 - c) 1111111100
 - d) 1111101010
2. The statement, "At least one of your friends is perfect". Let $P(x)$ be "x is perfect" and let $F(x)$ be "x is your friend" and let the domain be all people.
 - a) $\forall x (F(x) \rightarrow P(x))$
 - b) $\forall x (F(x) \wedge P(x))$
 - c) $\exists x (F(x) \wedge P(x))$
 - d) $\exists x (F(x) \rightarrow P(x))$
3. Consider a RAM chip that has the capacity of 1024 words of 8 bits each ($1k \times 8$). How many 2×4 decoders with enable line are needed to construct a $16K \times 16$ RAM from $1K \times 8$ RAM ?
 - a) 4
 - b) 8
 - c) 7
 - d) 5
4. A disk pack has 16 surfaces and in each surface 128 tracks is present and on each track 256 sectors are present. In a sector 512 byte of data are stored in a bit serial manner. What are the capacity of the disk pack and the number of bits required to specify a particular section in the disk ?
 - a) 256 Gbyte, 20 bits
 - b) 256 Gbyte, 64 bits
 - c) 256 Mbyte, 8 bits
 - d) 256 Mbyte, 19 bits

P.T.O.

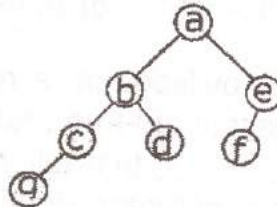


5. Operator overloading is
 - a) making c++ operator works with objects
 - b) giving new meaning to existing operator
 - c) making new operator
 - d) both a and b
6. Which of the following is a properly defined structure ?
 - a) struct {int a;}
 - b) struct a_struct {int a;}
 - c) struct a_struct int a;
 - d) struct a_struct {int a;};
7. Which one of the following statements about normal forms is FALSE ?
 - a) BCNF is stricter than 3NF
 - b) Lossless, dependency-preserving decomposition into 3NF is always possible
 - c) Lossless, dependency-preserving decomposition into BCNF is always possible
 - d) Any relation with two attributes is in BCNF
8. A _____ is a special kind of a store procedure that executes in response to certain action on the table like insertion, deletion or updation of data.
 - a) Procedures
 - b) Triggers
 - c) Functions
 - d) None of the mentioned
9. Consider a set of n tasks with known runtimes $r_1, r_2, \dots, r_n$ to be run on a uniprocessor machine. Which of the following processor scheduling algorithms will result in the maximum throughput ?
 - a) Round-Robin
 - b) Shortest-Job-First
 - c) Highest-Response-Ratio-Next
 - d) First-Come-First-Served
10. System calls are usually invoked by using
 - a) a software interrupt
 - b) polling
 - c) an indirect jump
 - d) a privileged instruction
11. The Incremental Model is a result of combination of elements of which two models ?
 - a) Build and Fix Model and Waterfall Model
 - b) Linear Model and RAD Model
 - c) Linear Model and Prototyping Model
 - d) Waterfall Model and RAD Model



12. Which regression test selection technique exposes faults caused by modifications ?
- a) Efficiency
 - b) Precision
 - c) Generality
 - d) Inclusiveness

13. In the balanced binary tree in the figure given below, how many nodes will become unbalanced when a node is inserted as a child of the node "g" ?



- a) 1
 - b) 3
 - c) 7
 - d) 8
14. Suppose the numbers 7, 5, 1, 8, 3, 6, 0, 9, 4, 2 are inserted in that order into an initially empty binary search tree. The binary search tree uses the usual ordering on natural numbers. What is the in-order traversal sequence of the resultant tree ?
- a) 7 5 1 0 3 2 4 6 8 9
 - b) 0 2 4 3 1 6 5 9 8 7
 - c) 0 1 2 3 4 5 6 7 8 9
 - d) 9 8 6 4 2 3 0 1 5 7
15. How many strings of length less than 4 contains the language described by the regular expression $(x + y)^*y(a + ab)^*$?
- a) 7
 - b) 10
 - c) 12
 - d) 11
16. The password to the admins account= "administrator". The total number of states required to make a password-pass system using DFA would be
- a) 14 states
 - b) 13 states
 - c) 12 states
 - d) A password pass system cannot be created using DFA
17. Which of the following system calls results in the sending of SYN packets ?
- a) socket
 - b) bind
 - c) listen
 - d) connect



18. In the IPv4 addressing format, the number of networks allowed under Class C addresses is

- a) 2^{14} b) 2^7 c) 2^{21} d) 2^{24}

19. There are n stations in a slotted LAN. Each station attempts to transmit with a probability p in each time slot. What is the probability that ONLY one station transmits in a given time slot?

- a) $(1 - p)^{n-1}$ b) $np(1 - p)^{n-1}$ c) $p(1 - p)^{n-1}$ d) $1 - (1 - p)^{n-1}$

20. Instead of representing knowledge in a relatively declarative, static way (as a bunch of things that are true), rule-based system represent knowledge in terms of _____ that tell you what you should do or what you could conclude in different situations.

- a) Raw text b) A bunch of rules
c) Summarized text d) Collection of various text

SECTION – B

Answer **any six** questions. **Each** question carries **five** marks. **(6×5=30)**

1. Explain different methods of representing relations with example.
 2. Explain with the block diagram the DMA transfer in a computer system.
 3. What are semaphores? Explain two primitive semaphore operations. What are its advantages?
 4. Describe the components and quality which is necessary for the documents of software specification.
 5. Show under what order of input, the insertion sort will have worst-case and best-case situations for sorting the set {142, 543, 123, 65, 453, 879, 572, 434}.
 6. Explain principal sources of code optimization techniques with example.
 7. Differentiate between co-back N and stop wait ARQ using diagram.
 8. What are the methods for handling deadlock? How will you prevent deadlock?
-