

<h1 style="margin: 0;">250</h1> <div style="border: 1px solid black; padding: 2px; text-align: center;"> <p style="margin: 0;">QUESTION PAPER SERIES CODE</p> <p style="font-size: 2em; margin: 0;">A</p> </div>	<p>Registration No. : <input style="width: 100px; height: 20px;" type="text"/></p> <p>Centre of Exam. : _____</p> <p>Name of Candidate : _____</p> <p style="text-align: right; margin-top: 20px;">_____ Signature of Invigilator</p>
<p>ENTRANCE EXAMINATION, 2018</p> <p>Ph.D. COMPUTER AND SYSTEMS SCIENCES</p> <p>[Field of Study Code : SCSH (890)]</p>	
<i>Time Allowed : 2 hours</i>	<i>Maximum Marks : 60</i>

1.
Recursively enumerable languages are not closed under

- (a) concatenation
- (b) complement
- (c) union
- (d) homomorphism

2.
Let L be a language that can be recognized by a finite automaton. The language LR consisting of reverse of the elements of L is a

- (a) regular language
- (b) context-free language
- (c) context-sensitive language
- (d) recursive language

3.
Consider the following context-free grammar:

$S \rightarrow XY, X \rightarrow aX \mid bX \mid a, Y \rightarrow Ya \mid Yb \mid a$

A string generated by this grammar has

- (a) at least one b
- (b) no consecutive a's or b's
- (c) at least two a's
- (d) last symbol as a

Solution:None of the given option is correct

4.

The basic logic of pumping lemma can be considered as a good example of

- (a) recursion
- (b) iteration
- (c) pigeonhole principle
- (d) divide-and-conquer

5.

Which of the following scheduling algorithms is non-preemptive?

- (a) Round-robin
- (b) First in, first out
- (c) Multilevel queue scheduling
- (d) Multilevel queue scheduling with feedback

6.

The part of machine level instruction, which tells central processor what has to be done, is

- (a) address
- (b) locator
- (c) operation code
- (d) flip-flop

7.

Which module gives control of the CPU to the process selected by the short-term scheduler?

- (a) Dispatcher
- (b) Interrupt
- (c) Scheduler
- (d) None of the above

8.

Which of the following is the locality of reference used in OS?

- (a) Memory is the locality in the system
- (b) Cache memory is local memory
- (c) Main memory is local memory
- (d) Control moves from one locality to another during the execution

9.

The database does not have the component

- (a) user data
- (b) metadata
- (c) reports
- (d) indexes

10.

Data duplication is affected by normalization in the way it

- (a) eliminates
- (b) reduces
- (c) increases
- (d) does not affect at all

11.

There are no multivalued attributes and also no partial dependencies in a relation. The relation is in

- (a) first normal form
- (b) second normal form
- (c) third normal form
- (d) fourth normal form

12.

Relational algebra is related to

- (a) metalanguage
- (b) data definition language
- (c) procedural query language
- (d) non-procedural query language

13.

Which of the following operations can be applied on arrays?

- (a) Updation
- (b) Addition
- (c) Deletion
- (d) All of the above

14.

The binary search of n data elements needs at most the comparisons

- (a) $\log_2(n) - 1$
- (b) $\log_2(n) + 1$
- (c) $\log_2(n) - 2$
- (d) $\log_2(n) - 4$

15.

Which is not true for a B-tree of order m ?

- (a) Leaf nodes must be at the same level
- (b) All the key values within a node must be in ascending order
- (c) All non-leaf nodes must have at least $m/2$ children
- (d) A non-leaf node with $(n-1)$ keys must have n numbers of children

16.

Which is not true about the graphs, assuming number of nodes/vertices as n ?

- (a) They can be represented by using adjacency list
- (b) They can be represented by using adjacency matrix
- (c) They can be represented by using incidence matrix
- (d) Addition of a node has complexity $O(n)$

17.

A program written in C is converted into machine language using

- (a) interpreter
- (b) compiler
- (c) editor
- (d) loader

18.

Consider the following statements in C: `int arr[10];`

- (a) `arr` and `&arr[0]` point to the address of first element
- (b) `arr[0]` is equivalent to `*arr`
- (c) Both (a) and (b) are correct
- (d) Either (a) or (b) is correct

19.

`#include <stdio.h>`

```

long int mNumber(int n);
int main( )
{
    scanf("%d", &n)
    printf("%d", mNum(n));
    return 0;
}
long int mNum(int n);
{
    return n * mNum(n-1);
}

```

Consider the above program, if a user enters input 5, the output will be

- (a) 120
- (b) nNum(5)
- (c) 4!
- (d) Cannot be computed

20.

```

Main ( )
{
    printf("\no borrow from");
    printf("\nbablu or");
    printf("\nrohit");
}

```

The output is

- (a) no borrow from bablu or rohit
- (b) no bablu rohit borrow or from
- (c) Both are correct depending on the process
- (d) None of the above

21.

The software interrupts in 8085 are in numbers

- (a) 5
- (b) 8
- (c) 12
- (d) 16

22.

To avoid the race condition, the number of processes that may be simultaneously inside a critical section is

- (a) 7
- (b) 5
- (c) 3
- (d) 1

23.

Stack pointer in 8085 is

- (a) a 16-bit register microprocessor used to indicate the beginning of stack memory
- (b) a register used to decode and execute 16-bit arithmetic expression
- (c) first memory location used to store a subroutine address
- (d) a register used to flag bits

24.

Which determines the address of I/O interface?

- (a) Register select
- (b) Chip select
- (c) Both of the above
- (d) None of the above

25.

The network layer does not have the functionality

- (a) routing
- (b) inter-networking
- (c) congestion control
- (d) error correction

26.

An endpoint of an inter-process communication flow across a computer network is called

- (a) socket
- (b) pipe
- (c) port
- (d) named pipe

27.

Transport layer protocol is associated to

- (a) application to application
- (b) process to process
- (c) node to node
- (d) end to end

28.

A packet travels from one end system to another end system. The delay occurring in travelling the packet is

- (a) propagation delay
- (b) queuing delay
- (c) transmission delay
- (d) All of the above

29.

A function $f(x)$ is defined as $f(x) = x - [x]$, where $[\cdot]$ represents the greatest integer function (GIF). Then

- (a) $f(x)$ will be integral part of x
- (b) $f(x)$ will be fractional part of x
- (c) $f(x)$ will always be zero
- (d) $f(x)$ will always be non-zero

30.

Let f and g be functions from the set of integers to itself, defined by $f(x) = (x + 1)^2$ and $g(x) = x^2 + 1$. Then the function $f \circ g$ is

- (a) $(x^2 + 2)^2$
- (b) $(x^2 + 1)^2$
- (c) $(x^2 + 1)^2 (x^2 + 1)$
- (d) None of the above

31.

The variance of the binomial distribution with parameters n and p is given by

- (a) p
- (b) np
- (c) $p(1 - p)$
- (d) $np(1 - p)$

32.

The mean of the exponential distribution with parameter λ is given by

- (a) λ
- (b) $1/\lambda$
- (c) λ^2
- (d) $\lambda(1 - \lambda)$

33.

The ratio of the mean to the variance of the Poisson distribution with parameter λ is given by

- (a) λ
- (b) $1/\lambda$
- (c) 1
- (d) $1 - \lambda$

34.

Which of the following distributions has the property of being memoryless?

- (a) Normal
- (b) Bernoulli
- (c) Binomial
- (d) Exponential

35.

In the beta distribution, the expected value of the random variable x is calculated as

- (a) $E(x) = m / (m - n)$
- (b) $E(x) = m / (m + n)$
- (c) $E(x) = n / (m + n)$
- (d) $E(x) = n / (m * n)$

36.

Process in which the trials are statistically independent and each trial of event has only two outcomes is classified as

- (a) Bayes process
- (b) functional process
- (c) independent limited process
- (d) Bernoulli process

37.

The expected value of the random variable x of gamma distribution is

- (a) $E(x) = pq/\mu$
- (b) $E(x) = \mu/np$
- (c) $E(x) = n/\mu$
- (d) $E(x) = \alpha/\mu$

38.

If we toss a biased coin that has $P(H) = 2P(T)$, then the probability of coming head is

- (a) 0
- (b) $1/2$
- (c) $1/3$
- (d) $2/3$

39.

The covariance $\text{cov}(X, Y)$ of two independent random variables X and Y is

- (a) 0
- (b) 1
- (c) -1
- (d) $\text{var}(X) \text{var}(Y)$

40.

A set of all possible outcomes of an experiment is called

- (a) combination
- (b) sample point
- (c) compound event
- (d) sample space

41.

Classroom communication must be

- (a) teacher-centric
- (b) student-centric
- (c) general-centric
- (d) textbook-centric

42.

The type of communication that a teacher has in the class is termed as

- (a) interpersonal
- (b) mass communication
- (c) group communication
- (d) face-to-face communication

43.

Interaction inside the class should generate

- (a) argument
- (b) information
- (c) ideas
- (d) controversy

44.

The best method of teaching is to

- (a) initiate discussion and participate
- (b) import information
- (c) ask students to read books
- (d) suggest good reference material

45.

Teacher's most precious asset is

- (a) his/her job
- (b) student's faith
- (c) prejudice
- (d) books

46.

The most important thing in the behaviour of a teacher is

- (a) dominance
- (b) discipline
- (c) sympathy
- (d) patience

47.

Which of the following is not research?

- (a) Exploratory research study
- (b) Descriptive research study
- (c) Diagnostic research study
- (d) Populistic research study

48.

Successful teacher is one who can

- (a) teach subject text properly
- (b) describe the subject
- (c) encourage the students
- (d) help in evaluation

49.

The number of significant digits in the number 4.3700×10^{-2} is

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

50.

The research that aims at finding the solutions for an intermediate problem faced by a society, industry or business organization can be closely related to

- (a) applied research
- (b) fundamental research
- (c) conceptual research
- (d) primary research

51.

Round-off error in the number 6.436 rounded off to 6.44 is

- (a) 0.0062%
- (b) 0.062%
- (c) 0.62%
- (d) 6.2%

52.

ANOVA stands for

- (a) Analysis of Vector
- (b) Analysis of Validation
- (c) Analysis of Variance
- (d) Analysis of Variability

53.

A good research should be

- (a) logical
- (b) replicable
- (c) systematic
- (d) All of the above

54.

A good research investigating the reasons for human behaviour could be closely termed as

- (a) quantitative research
- (b) qualitative research
- (c) fundamental research
- (d) simulation research

55.

Through the principle of replication, the accuracy of experiments

- (a) is increased
- (b) is decreased
- (c) is not affected
- (d) may decrease or increase

56.

Given $E(x) = 5$ and $E(Y) = -3$, then $E(3X + 2Y)$ is

- (a) 3
- (b) 5
- (c) 9
- (d) -2

57.

Which of the following inequalities is useful for interpreting variances?

- (a) Chebyshev
- (b) Statutory
- (c) Testory
- (d) All of the mentioned

58.

The weight of persons in a city is a random variable of type

- (a) discrete random variable
- (b) continuous random variable
- (c) mixed-type random variable
- (d) None of the above

59.

Which of the following is not a type of research design?

- (a) Confirmatory research design
- (b) Descriptive and diagnostic research design
- (c) Exploratory research design
- (d) Hypothesis-testing research design

60.

Let $f(x)$ be the probability density function. Then

$$\int_{-\infty}^{\infty} f(x) dx$$

is always equal to

- (a) 0
- (b) ∞

(c) 1

(d) $f(x) + 1$
