Roll No. | | | | | | | |

(Write Roll Number from left side exactly as in the Admit Card)

Signature of Invigilators

1. _____

2. _____

2215

Question Booklet Series **A**

PAPER–II

Question Booklet No.

Subject Code : 22

OMR Sheet No. .....

COMPUTER SCIENCE AND APPLICATIONS

Time : 1 Hour 15 Minutes *Maximum Marks: 100*

Instructions for the Candidates

1. Write your Roll Number in the space provided on the top of this page as well as on the OMR Sheet provided.
2. At the commencement of the examination, the question booklet will be given to you. In the first 5 minutes, you are requested to open the booklet and verify it:
   (i) To have access to the Question Booklet, tear off the paper seal on the edge of this cover page.
   (ii) Faulty booklet, if detected, should be got replaced immediately by a correct booklet from the invigilator within the period of 5 minutes. Afterwards, neither the Question Booklet will be replaced nor any extra time will be given.
   (iii) After this verification is over, the Question Booklet Series and Question Booklet Number should be entered on the OMR Sheet and the OMR Sheet Number should be entered on this Question Booklet.
3. This paper consists of fifty (50) multiple-choice type questions. All the questions are compulsory. Each question carries *two* marks.
4. Each Question has four alternative responses marked: (A) (B) (C) (D). You have to darken the circle as indicated below on the correct response against each question.

   Example: (A) (B) ● (D), where (C) is the correct response.
5. Your responses to the questions are to be indicated correctly in the OMR Sheet. If you mark your response at any place other than in the circle in the OMR Sheet, it will not be evaluated.
6. Rough work is to be done at the end of this booklet.
7. If you write your Name, Roll Number, Phone Number or put any mark on any part of the OMR Sheet, except for the space allotted for the relevant entries, which may disclose your identity, or use abusive language or employ any other unfair means, such as change of response by scratching or using white fluid, you will render yourself liable to disqualification.
8. Do not tamper or fold the OMR Sheet in any way. If you do so, your OMR Sheet will not be evaluated.
9. You have to return the Original OMR Sheet to the invigilator at the end of the examination compulsorily and must not carry it with you outside the Examination Hall. You are, however, allowed to carry question booklet and duplicate copy of OMR Sheet after completion of examination.
10. **Use only Blue/Black Ball point pen.**
11. **Use of any calculator or log table or mobile phone etc. is strictly prohibited.**
12. **There are no negative marks for incorrect answers.**

[Please Turn Over]

COMPUTER SCIENCE AND APPLICATIONS

PAPER—II

1. Suppose A = $\frac{1}{2}$, B= $-\frac{1}{2}$, C = 7.0, D = 3.1. What is the value of

$$(\lfloor A \rfloor - \lceil B \rceil + \lfloor C \rfloor * \lceil D \rceil)/C \ ?$$

(A) 3

(B) 4

(C) 5

(D) 0

2. How many distinct simple connected graphs can be constructed with 1 to 4 nodes?

(A) 12

(B) 10

(C) 7

(D) 8

3. Suppose n is a positive integer power of 3 and

$f(n) = f\left(\frac{n}{3}\right) + 1$ for n odd power of 3

$= f\left(\frac{n}{3}\right) - 2$ for n even power of 3.

What is the value of f(81)?

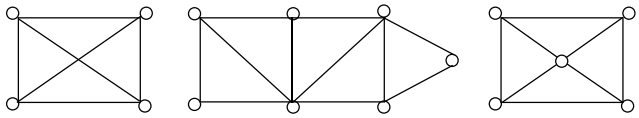
(A) –1

(B) 0

(C) 1

(D) 3

4. Consider the following three graphs:



Which of the following is true?

(A) G_1 has Hamiltonian path
G_2 has Hamiltonian path
G_3 has Eulerian path

(B) G_1 has Eulerian cycle
G_2 has Eulerian path
G_3 has Hamiltonian cycle

(C) G_1 is Eulerian graph
G_2 is Hamiltonian graph
G_3 is Hamiltonian graph

(D) G_1 has Hamiltonian path
G_2 has no Eulerian path
G_3 is Hamiltonian graph

5. Consider the regular expression
$(0^* \cup (((0^*(1 \cup (11))) ((00^*) (1 \cup (11)))^*) 0^*))$
over {0,1}. What does it represent?

(A) All binary strings.

(B) Binary strings with 0 and 1 appearing in the ratio 5 : 6.

(C) Binary strings with equal number of 0's and 1's.

(D) All binary strings that do not have the substring 111.

6. Some Boolean function is captured in the following Karnaugh's map:

zw \ xy	00	01	11	10
00		1	1	
01	1			1
11	1			1
10		1	1	1

What is the minimized form of the function out of the following?

(A) $yz' + zy'$

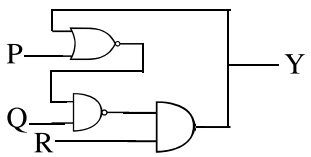
(B) $y'w + w'y + zw'x$

(C) $xyw + wz + xyz$

(D) $y'w + w'y + xzw' + xy'z$

7. Consider the logic circuit given below:

In a certain steady state the line Y is at '1' level. What are the possible values of the input?



What are the possible values of the input P,Q,R ?

(A) P=1, Q=0, R=0

(B) P=0, Q=0, R=1

(C) P=0, Q=1, R=0

(D) P=1, Q=1, R=0

8. In MPI message passing routines, there are two types of 'send' and 'receive'. What is true about these?

(A) Blocking and non-blocking receive routines have the same arguments.

(B) Blocking send and non-blocking send have different-number of arguments.

(C) Blocking receive and non-blocking receive have different number of arguments.

(D) Receive and send routines have the same number of arguments irrespective of blocking or non-blocking.

9. The lists of Top 500 computer systems world over are announced

(A) thrice in a year

(B) four times in a year

(C) alternate year

(D) twice in a year

10. Tracking and recording of page modification is usually performed in hardware by adding a written-into bit to each entry of the page map table. This table is called

(A) Buddy bits

(B) Protection bits

(C) Priority bits

(D) Dirty bits

11. A static partitioned memory management system has a total of six partitions. If one is allocated to the operating system, this will allow a total of _____ user jobs.

(A) 5

(B) 6

(C) 7

(D) 64

12. _____ is the basic thread operation which is related to the change in thread state that occurs when a thread needs to wait for an event referred

(A) Spawn operation

(B) Block operation

(C) Unblock operation

(D) Release operation

13. Consider two processes P_1 and P_2 accessing the shared variables X and Y protected by two binary semaphores S_X and S_Y respectively, both initialized to 1. P and V denote the usual semaphore operators with P decrementing the semaphore value and V incrementing the semaphore value. The pseudo-code of P_1 and P_2 is as follows :

P_1:	P_2:
While true do {	While true do {
L_1 : _____	L_3 : _____
L_2 : _____	L_4 : _____
X= X+1;	Y= Y+1;
Y= Y–1;	X= Y–1;
V(S_X);	V(S_Y);
V(S_Y);	V(S_X);
}	}

In order to avoid deadlock, the correct operators at L_1, L_2, L_3, L_4 are respectively

(A) P(S_Y), P(S_X), P(S_X), P(S_Y)

(B) P(S_X), P(S_Y), P(S_Y), P(S_X)

(C) P(S_X), P(S_X), P(S_Y), P(S_Y)

(D) P(S_X), P(S_Y), P(S_X), P(S_Y)

14. A process executes the code

for $(i = 1; i \leq n; i++)$

Fork ();

The total number of child processes created is

(A) n

(B) $2^n - 1$

(C) 2^{n-1}

(D) $2^n + 1$

15. Which of the following is not shared by the threads of the same process?

(A) Stack

(B) Address Space

(C) File Descriptor Table

(D) Message Queue

16. If a client on host X assigned port 1625, with IP address 146.86.5.20 wishes to establish connection with a web server, listening on port 80, at address 161.25.19.8, that host X assigned, the connection will consist of a pair of sockets S_X on host X and S_W on web server [represented as pair (S_X, S_W) respectively] as—

(A) (146.86.5.20: 1625, 161.25.19.8: 80)

(B) (146.86.5.20: 80, 161.25.19.8: 1625)

(C) (146.86.5.20: 1625, 161.25.19.8: 1625)

(D) (146.86.5.20: 80, 161.25.19.8: 80)

17. Keeping in mind that only a device with local computing and communication capabilities can be considered to be a valid Network Node, please answer the following question.

If a set-up involves an interconnection of five personal computers, one large computer attached to five dumb terminals and a Layer-2/3 network switch, then how many network nodes are there in the resultant networked set-up?

(A) 11

(B) 07

(C) 12

(D) 06

18. Which of the following application layer protocols supports transfer of files of smaller sizes fit enough to be contained within a single packet over UDP transport?

(A) FTP

(B) SFTP

(C) TFTP

(D) HTTP

19. If you need to interact with five friends, located around the world and interconnected via the Internet, using IP-based video-conferencing, which of the following techniques would make the best sense at the IP-level?

(A) Unicasting

(B) Broadcasting

(C) Multicasting

(D) Anycasting

20. Which of the following pair of IEEE 802 Standards represent a pair comprising of Wired LAN standard and a Wireless LAN standard?

(A) IEEE 802.15.1 and IEEE 802.15.4

(B) IEEE 802.3 and IEEE 802.11

(C) IEEE 802.4 and IEEE 802.5

(D) None of the above

21. The term VSAT stands for

(A) Very high-orbit SATellite

(B) Very Small Aperature Terminal

(C) Venezuelan SATellite

(D) Very Short-sized Antenna-based Transmitter

22. Which one of these is an example of Traffic-Shaping Algorithm that does not lead to packet-loss/ cell-loss?

(A) Token Bucket Algorithm

(B) Leaky Bucket Algorithm

(C) Token as well as Leaky Bucket Algorithms

(D) None of the above

23. Asymmetric Cryptography features:

(A) two different keys randomly chosen.

(B) two different keys mathematically so linked that by knowing one, determining the other is extremely difficult.

(C) two keys, one of which is expressed as the Two's Complement of the other.

(D) a single key that is used for encryption as well as decryption.

24. What is the typical shape of a 'cell' in the GSM Communication Network over which GPRS/EDGE service is provided?

(A) Rectangular

(B) Pentagonal

(C) Hexagonal

(D) Octagonal

25. In Mobile IPv6 based set-up, which of the following is present?

(A) Home Agent

(B) Foreign Agent

(C) Mobile Agent

(D) Jumbogram

26. Which of the following problems is faced as the most challenging problem when a mobile computing user using a Smartphone moves across service areas of multiple Internet Service Providers?

(A) Seamless Hand-off

(B) Authentication

(C) Authorization

(D) Integrity-check

27. Which of the following is true?

(A) A relation in 3NF is also in BCNF.

(B) A relation in BCNF is also in 3NF.

(C) There is no relation between BCNF and 3NF.

(D) A relation in BCNF is in 3NF, but not in 2NF.

28. A relation which is in 3NF may still have some data redundency because there may exist

(A) non-trivial functional dependencies involving prime attributes on the right hand.

(B) non-trivial functional dependencies involving prime attributes on the left hand.

(C) non-trivial functional dependencies involving only prime attributes.

(D) transitive functional dependencies.

29. Consider the following schema :

employee (Person-name, Street, City)
Works (Person-name, Company-name, Salary)
Company-name (Company-name, City)

The relational algebraic expression for "names of all employees who lives in the same city as the company for which they work" is

(A) $\Pi_{\text{person-name}}$ (employee $\bowtie$ works $\bowtie$ company)

(B) $\Pi_{\text{person-name}}$ (employee $\bowtie$ works $\bowtie$ company)

(C) $\Pi_{\text{person-name}}$ (employee $\bowtie$ works $\bowtie$ company)

(D) $\Pi_{\text{person-name}}$ (employee $\bowtie$ works $\bowtie$ company)

30. Consider the employee table EMP (id, salary) with id as primary key.

Consider the following queries for obtaining the id, with Kth highest salary (with a given K) :

Q1. Select id from EMP E
where K = (Select Count (*) From EMP E1
where E1. Salary ≥ E. Salary)

Q2. Select id from EMP E1
where K–1 = (Select Count (*) From EMP E2
where E2. Salary ≥ E1. Salary)

(A) Only Q1

(B) Only Q2

(C) Both Q1 and Q2

(D) None of the above

31. A Schedule

S : T2 : Read A; T3 : Read B; T2 : Write A;
T1 : Read A; T3 : Write B; T2 : Read B;
T1 : Write A; T2 : Read C; T2 : Write C;
T1 : Read C;

If the above schedule is serializable which one is equivalent?

(A) T1 → T2 → T3

(B) It is not serializable

(C) T2 → T1 → T3

(D) T3 → T2 → T1

32. Software Agents are having

(A) intelligent behaviour

(B) independent behaviour

(C) cognitive behaviour

(D) all of the above

33. Operator overloading is

(A) making C++ operators works with objects.

(B) giving new meaning to existing operators.

(C) Both (A) & (B)

(D) None of the above

34. Abstract class cannot have

(A) Multiple Instance

(B) Zero Instance

(C) Both (A) and (B)

(D) None of the above

35. Runtime polymorphism is achieved by

(A) function overloading

(B) operator overloading

(C) virtual function

(D) Both (A) & (C)

36. If we create a file by ''ifstream'' then the default mode of the file is

(A) ios :: in

(B) ios :: out

(C) ios :: App

(D) ios :: binary

37. Data Mining deals with

(A) discovering knowledge from databases only.

(B) discovering knowledge from web only.

(C) Both (A) & (B)

(D) None of the above

38. Reactive Agents are also known as
(A) goal based agents
(B) utility based agents
(C) simple reflexive agents
(D) None of the above

39. The number of interchanges required to sort 8, 22, 7, 9, 31, 19, 5, 13 in ascending order using bubble sort is
(A) 11
(B) 12
(C) 13
(D) 14

40. Consider the following sequence of operations that are performed in a stack :
Push (1), Push (2), Push (3), Pop, Push (4), Push (5), Pop, Pop, Pop, Push (6), Pop, Pop, then the sequence of popped out values are
(A) 3, 5, 4, 2, 6, 1
(B) 3, 5, 2, 4, 1, 6
(C) 3, 5, 2, 6, 1, 4
(D) 3, 5, 4, 6, 1, 2

41. Maximum possible height of an AVL tree with 7 nodes is
(A) 3
(B) 4
(C) 5
(D) None of the above

42. The heap (represented by an array) constructed from the list of numbers 30, 10, 80, 60, 15, 55, 17 is
(A) 60, 80, 55, 30, 10, 17, 15
(B) 80, 55, 60, 15, 10, 30, 17
(C) 80, 60, 30, 17, 55, 15, 10
(D) None of the above

43. The output of lexical analyzer is
(A) a set of regular expressions
(B) syntax tree
(C) set of tokens
(D) transition diagram

44. The grammar
$A \rightarrow AA \mid (A) \mid \in$
is not suitable for predictive parsing because this grammar is
(A) ambiguous
(B) left-recursive
(C) right-recursive
(D) an operator grammar

45. A top-down parser generates
(A) rightmost derivation
(B) rightmost derivation in reverse
(C) leftmost derivation
(D) leftmost derivation in reverse

46. The following grammar
$S \rightarrow Aa / bAc / Bc / bBA$
$A \rightarrow d$
$B \rightarrow d$
where S is the start symbol, A, B are non-terminals, a, b, c, d are terminals is
(A) LR (1)
(B) LALR (1)
(C) SLR
(D) Both (A) and (B)

47. A compiler which runs on one machine and generates a code for another machine is
(A) Bootstrap-Compiler
(B) Cross-Compiler
(C) Data Flow-Compiler
(D) Exchange-Compiler

48. White-Box Testing is sometimes called
(A) Structural Testing
(B) Functional Testing
(C) Data-Flow Testing
(D) Stress Testing

49. Effort is measured in terms of

(A) person-months

(B) rupees

(C) persons

(D) months

50. When two modules refer to the same global data area, they are related as

(A) external coupled

(B) data coupled

(C) content coupled

(D) common coupled

ROUGH WORK

ROUGH WORK

ROUGH WORK