PAPER-II
COMPUTER SCIENCE & APPLICATIONS

Signature and Name of Invigilator

1. (Signature) _____

   (Name) _____

2. (Signature) _____

   (Name) _____

OMR Sheet No. : .....

(To be filled by the Candidate)

Roll No. | | | | | | | | |

(In figures as per admission card)

Roll No._____

(In words)

J A 0 8 7 1 7

Time : **1 ¼** hours] [Maximum Marks : **100**

Number of Pages in this Booklet : **16**

Number of Questions in this Booklet : **50**

Instructions for the Candidates

1. Write your roll number in the space provided on the top of this page.
2. This paper consists of fifty multiple-choice type of questions.
3. At the commencement of examination, the question booklet will be given to you. In the first 5 minutes, you are requested to open the booklet and compulsorily examine it as below :
   (i) To have access to the Question Booklet, tear off the paper seal on the edge of this cover page. Do not accept a booklet without sticker-seal and do not accept an open booklet.
   (ii) **Tally the number of pages and number of questions in the booklet with the information printed on the cover page. Faulty booklets due to pages/questions missing or duplicate or not in serial order or any other discrepancy 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 Test Booklet Number should be entered on the OMR Sheet and the OMR Sheet Number should be entered on this Test Booklet.
   (iv) The test booklet no. and OMR sheet no. should be same. In case of discrepancy in the number, the candidate should immediately report the matter to the invigilator for replacement of the Test Booklet / OMR Sheet.
4. Each item has four alternative responses marked (1), (2), (3) and (4). You have to darken the circle as indicated below on the correct response against each item.
   Example : ① ② ● ④
   where (3) is the correct response.
5. Your responses to the items are to be indicated in the **OMR Sheet given inside the Booklet only.** If you mark your response at any place other than in the circle in the OMR Sheet, it will not be evaluated.
6. Read instructions given inside carefully.
7. Rough Work is to be done in the end of this booklet.
8. 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.
9. You have to return the Original OMR Sheet to the invigilators at the end of the examination compulsorily and must not carry it with you outside the Examination Hall. You are, however, allowed to carry original question booklet on conclusion of examination.
10. **Use only Black Ball point pen.**
11. **Use of any calculator or log table etc., is prohibited.**
12. **There is no negative marks for incorrect answers.**

परीक्षार्थियों के लिए निर्देश

1. इस पृष्ठ के ऊपर नियत स्थान पर अपना रोल नम्बर लिखिए ।
2. इस प्रश्न-पत्र में पचास बहुविकल्पीय प्रश्न हैं ।
3. परीक्षा प्रारम्भ होने पर, प्रश्न-पुस्तिका आपको दे दी जायेगी । पहले पाँच मिनट आपको प्रश्न-पुस्तिका खोलने तथा उसकी निम्नलिखित जाँच के लिए दिये जायेंगे, जिसकी जाँच आपको अवश्य करनी है :
   (i) प्रश्न-पुस्तिका खोलने के लिए पुस्तिका पर लगी कागज की सील को फाड़ लें । खुली हुई या बिना स्टीकर-सील की पुस्तिका स्वीकार न करें ।
   (ii) **कवर पृष्ठ पर छपे निर्देशानुसार प्रश्न-पुस्तिका के पृष्ठ तथा प्रश्नों की संख्या को अच्छी तरह चैक कर लें कि ये पूरे हैं । दोषपूर्ण पुस्तिका जिनमें पृष्ठ/प्रश्न कम हों या दुबारा आ गये हों या सीरियल में न हों अर्थात किसी भी प्रकार की त्रुटिपूर्ण पुस्तिका स्वीकार न करें तथा उसी समय उसे लौटाकर उसके स्थान पर दूसरी सही प्रश्न-पुस्तिका ले लें । इसके लिए आपको पाँच मिनट दिये जायेंगे । उसके बाद न तो आपकी प्रश्न-पुस्तिका वापस ली जायेगी और न ही आपको अतिरिक्त समय दिया जायेगा ।**
   (iii) इस जाँच के बाद प्रश्न-पुस्तिका का नंबर OMR पत्रक पर अंकित करें और OMR पत्रक का नंबर इस प्रश्न-पुस्तिका पर अंकित कर दें ।
   (iv) प्रश्न पुस्तिका नं. और OMR पत्रक नं. समान होने चाहिए । यदि नंबर भिन्न हों, तो परीक्षार्थी प्रश्न-पुस्तिका / OMR पत्रक बदलने के लिए निरीक्षक को तुरंत सूचित करें ।
4. प्रत्येक प्रश्न के लिए चार उत्तर विकल्प (1), (2), (3) तथा (4) दिये गये हैं । आपको सही उत्तर के वृत्त को पेन से भरकर काला करना है जैसा कि नीचे दिखाया गया है :
   उदाहरण : ① ② ● ④
   जबकि (3) सही उत्तर है ।
5. प्रश्नों के उत्तर **केवल प्रश्न पुस्तिका के अन्दर दिये गये OMR पत्रक पर ही** अंकित करने हैं । यदि आप OMR पत्रक पर दिये गये वृत्त के अलावा किसी अन्य स्थान पर उत्तर चिह्नांकित करते हैं, तो उसका मूल्यांकन नहीं होगा ।
6. अन्दर दिये गये निर्देशों को ध्यानपूर्वक पढ़ें ।
7. कच्चा काम (Rough Work) इस पुस्तिका के अन्तिम पृष्ठ पर करें ।
8. यदि आप OMR पत्रक पर नियत स्थान के अलावा अपना नाम, रोल नम्बर, फोन नम्बर या कोई भी ऐसा चिह्न जिससे आपकी पहचान हो सके, अंकित करते हैं अथवा अभद्र भाषा का प्रयोग करते हैं, या कोई अन्य अनुचित साधन का प्रयोग करते हैं, जैसे कि अंकित किये गये उत्तर को मिटाना या सफेद स्याही से बदलना तो परीक्षा के लिये अयोग्य घोषित किये जा सकते हैं ।
9. आपको परीक्षा समाप्त होने पर मूल OMR पत्रक निरीक्षक महोदय को लौटाना आवश्यक है और परीक्षा समाप्ति के बाद उसे अपने साथ परीक्षा भवन से बाहर न लेकर जायें । हालांकि आप परीक्षा समाप्ति पर मूल प्रश्न-पुस्तिका अपने साथ ले जा सकते हैं ।
10. **काले बाल प्वाईंट पेन का ही इस्तेमाल करें ।**
11. **किसी भी प्रकार का संगणक (कैलकुलेटर) या लाग टेबल आदि का प्रयोग वर्जित है ।**
12. **गलत उत्तरों के लिए कोई नकारात्मक अंक नहीं हैं ।**

COMPUTER SCIENCE & APPLICATIONS

Paper – II

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

1. Consider a sequence F_{00} defined as :

$F_{00}(0) = 1, F_{00}(1) = 1$

$$F_{00}(n) = \frac{10 * F_{00}(n-1) + 100}{F_{00}(n-2)} \text{ for } n \geq 2$$

Then what shall be the set of values of the sequence F_{00} ?

(1) (1, 110, 1200) (2) (1, 110, 600, 1200)

(3) (1, 2, 55, 110, 600, 1200) (4) (1, 55, 110, 600, 1200)

2. Match the following :

	List – I		**List – II**
a.	Absurd	i.	Clearly impossible being contrary to some evident truth.
b.	Ambiguous	ii.	Capable of more than one interpretation or meaning.
c.	Axiom	iii.	An assertion that is accepted and used without a proof.
d.	Conjecture	iv.	An opinion preferably based on some experience or wisdom.

Codes :

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

3. The functions mapping R into R are defined as :

$f(x) = x^3 - 4x$, $g(x) = \frac{1}{x^2 + 1}$ and $h(x) = x^4$.

Then find the value of the following composite functions :

$h \circ g(x)$ and $h \circ g \circ f(x)$

(1) $(x^2 + 1)^4$ and $[(x^3 - 4x)^2 + 1]^4$

(2) $(x^2 + 1)^4$ and $[(x^3 - 4x)^2 + 1]^{-4}$

(3) $(x^2 + 1)^{-4}$ and $[(x^2 - 4x)^2 + 1]^4$

(4) $(x^2 + 1)^{-4}$ and $[(x^3 - 4x)^2 + 1]^{-4}$

4. How many multiples of 6 are there between the following pairs of numbers ?

0 and 100 and –6 and 34

(1) 16 and 6

(2) 17 and 6

(3) 17 and 7

(4) 16 and 7

5. Consider a Hamiltonian Graph G with no loops or parallel edges and with $|V(G)| = n \geq 3$. Then which of the following is true ?

(1) $\deg(v) \geq \frac{n}{2}$ for each vertex v.

(2) $|E(G)| \geq \frac{1}{2}(n - 1)(n - 2) + 2$

(3) $\deg(v) + \deg(w) \geq n$ whenever v and w are not connected by an edge.

(4) All of the above

6. In propositional logic if $(P \rightarrow Q) \wedge (R \rightarrow S)$ and $(P \vee R)$ are two premises such that

$$\frac{\begin{array}{c}(P \rightarrow Q) \wedge (R \rightarrow S) \\ P \vee R\end{array}}{Y}$$

Y is the premise :

(1) $P \vee R$

(2) $P \vee S$

(3) $Q \vee R$

(4) $Q \vee S$

7. ECL is the fastest of all logic families. High speed in ECL is possible because transistors are used in difference amplifier configuration, in which they are never driven into ____.

(1) Race condition (2) Saturation

(3) Delay (4) High impedance

8. A binary 3-bit down counter uses J-K flip-flops, FF_i with inputs J_i, K_i and outputs Q_i, i = 0, 1, 2 respectively. The minimized expression for the input from following, is

I. $J_0 = K_0 = 0$

II. $J_0 = K_0 = 1$

III. $J_1 = K_1 = Q_0$

IV. $J_1 = K_1 = \bar{Q}_0$

V. $J_2 = K_2 = Q_1 Q_0$

VI. $J_2 = K_2 = \bar{Q}_1 \bar{Q}_0$

(1) I, III, V (2) I, IV, VI

(3) II, III, V (4) II, IV, VI

9. Convert the octal number 0.4051 into its equivalent decimal number.

(1) 0.5100098 (2) 0.2096

(3) 0.52 (4) 0.4192

10. The hexadecimal equivalent of the octal number 2357 is :

(1) 2EE (2) 2FF

(3) 4EF (4) 4FE

11. Which of the following cannot be passed to a function in C++ ?

(1) Constant (2) Structure

(3) Array (4) Header file

12. Which one of the following is correct for overloaded functions in C++ ?

(1) Compiler sets up a separate function for every definition of function.

(2) Compiler does not set up a separate function for every definition of function.

(3) Overloaded functions cannot handle different types of objects.

(4) Overloaded functions cannot have same number of arguments.

13. Which of the following storage classes have global visibility in C/C++ ?

(1) Auto

(2) Extern

(3) Static

(4) Register

14. Which of the following operators cannot be overloaded in C/C++ ?

(1) Bitwise right shift assignment

(2) Address of

(3) Indirection

(4) Structure reference

15. If X is a binary number which is power of 2, then the value of

X & (X – 1) is :

(1) 11….11

(2) 00…..00

(3) 100…..0

(4) 000……1

16. An attribute A of datatype varchar (20) has value 'Ram' and the attribute B of datatype char (20) has value 'Sita' in oracle. The attribute A has _____ memory spaces and B has _____ memory spaces.

(1) 20, 20

(2) 3, 20

(3) 3, 4

(4) 20, 4

17. Integrity constraints ensure that changes made to the database by authorized users do not result into loss of data consistency. Which of the following statement(s) is (are) true w.r.t. the examples of integrity constraints ?

(A) An instructor Id. No. cannot be null, provided Intructor Id No. being primary key.

(B) No two citizens have same Adhar-Id.

(C) Budget of a company must be zero.

(1) (A), (B) and (C) are true.

(2) (A) false, (B) and (C) are true.

(3) (A) and (B) are true; (C) false.

(4) (A), (B) and (C) are false.

18. Let M and N be two entities in an E-R diagram with simple single value attributes. R_1 and R_2 are two relationship between M and N, where as

R_1 is one-to-many and R_2 is many-to-many.

The minimum number of tables required to represent M, N, R_1 and R_2 in the relational model are _____.

(1) 4 (2) 6

(3) 7 (4) 3

19. Consider a schema R(MNPQ) and functional dependencies M $\rightarrow$ N, P $\rightarrow$ Q. Then the decomposition of R into R_1(MN) and R_2(PQ) is _____.

(1) Dependency preserving but not lossless join

(2) Dependency preserving and lossless join

(3) Lossless join but not dependency preserving

(4) Neither dependency preserving nor lossless join.

20. The order of a leaf node in a B^+ tree is the maximum number of children it can have. Suppose that block size is 1 kilobytes, the child pointer takes 7 bytes long and search field value takes 14 bytes long. The order of the leaf node is _____.

(1) 16 (2) 63

(3) 64 (4) 65

21. Which of the following is true for computation time in insertion, deletion and finding maximum and minimum element in a sorted array ?

(1) Insertion – 0(1), Deletion – 0(1), Maximum – 0(1), Minimum – 0(l)

(2) Insertion – 0(1), Deletion – 0(1), Maximum – 0(n), Minimum – 0(n)

(3) Insertion – 0(n), Deletion – 0(n), Maximum – 0(1), Minimum – 0(1)

(4) Insertion – 0(n), Deletion – 0(n), Maximum – 0(n), Minimum – 0(n)

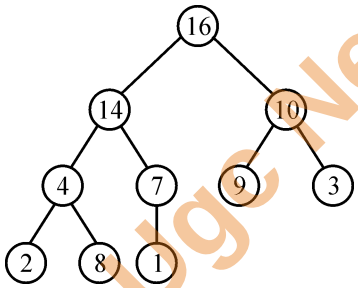
22. The seven elements A, B, C, D, E, F and G are pushed onto a stack in reverse order, i.e., starting from G. The stack is popped five times and each element is inserted into a queue. Two elements are deleted from the queue and pushed back onto the stack. Now, one element is popped from the stack. The popped item is _____.

(1) A (2) B

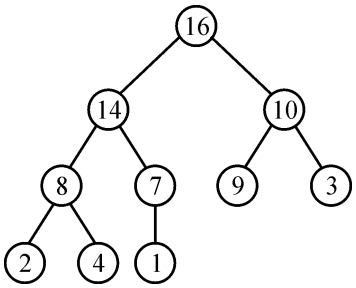
(3) F (4) G

23. Which of the following is a valid heap ?

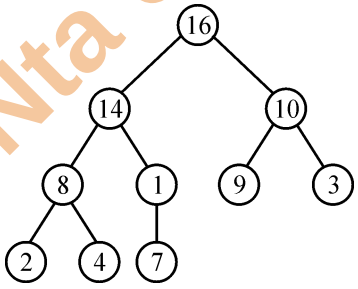
(A)



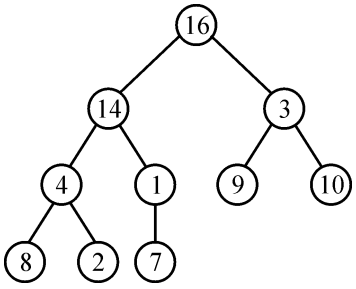
(B)



(C)



(D)



(1) A (2) B

(3) C (4) D

24. If h is chosen from a universal collection of hash functions and is used to hash n keys into a table of size m, where n ≤ m, the expected number of collisions involving a particular key *x* is less than _____.

(1) 1 (2) 1/n

(3) 1/m (4) n/m

25. Which of the following statements is false ?

(A) Optimal binary search tree construction can be performed efficiently using dynamic programming.

(B) Breadth-first search cannot be used to find connected components of a graph.

(C) Given the prefix and postfix walks of a binary tree, the tree cannot be re-constructed uniquely.

(D) Depth-first-search can be used to find the connected components of a graph.

(1) A (2) B

(3) C (4) D

26. Match the following Layers and Protocols for a user browsing with SSL :

a.	Application of layer	i.	TCP
b.	Transport layer	ii.	IP
c.	Network layer	iii.	PPP
d.	Datalink layer	iv.	HTTP

Codes :

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

27. The maximum size of the data that the application layer can pass on to the TCP layer below is _____.

(1) 2^{16} bytes

(2) 2^{16} bytes + TCP header length

(3) 2^{16} bytes – TCP header length

(4) 2^{15} bytes

28. A packet whose destination is outside the local TCP/IP network segment is sent to _____.

(1) File server

(2) DNS server

(3) DHCP server

(4) Default gateway

29. Distance vector routing algorithm is a dynamic routing algorithm. The routing tables in distance vector routing algorithm are updated _____.

(1) automatically

(2) by server

(3) by exchanging information with neighbour nodes

(4) with back up database

30. In link state routing algorithm after construction of link state packets, new routes are computed using :

(1) DES algorithm

(2) Dijkstra's algorithm

(3) RSA algorithm

(4) Packets

31. Which of the following strings would match the regular expression : p+ [3 – 5]* [*x*yz] ?

I. p443y

II. p6y

III. 3*x*yz

IV. p35z

V. p353535*x*

VI. ppp5

(1) I, III and VI only

(2) IV, V and VI only

(3) II, IV and V only

(4) I, IV and V only

32. Consider the following assembly language instructions :

mov al, 15

mov ah, 15

xor al, al

mov cl, 3

shr ax, cl

add al, 90H

adc ah, 0

What is the value in a*x* register after execution of above instructions ?

(1) 0270H (2) 0170H

(3) 01E0H (4) 0370H

33. Consider the following statements related to compiler construction :

I. Lexical Analysis is specified by context-free grammars and implemented by pushdown automata.

II. Syntax Analysis is specified by regular expressions and implemented by finite-state machine.

Which of the above statement(s) is/are correct ?

(1) Only I (2) Only II

(3) Both I and II (4) Neither I nor II

34. The contents of Register (BL) and Register (AL) of 8085 microprocessor are 49H and 3AH respectively. The contents of AL, the status of carry flag (CF) and sign flag (SF) after executing 'SUB AL, BL' assembly language instruction, are

(1) AL = 0FH; CF = 1; SF = 1

(2) AL = F0H; CF = 0; SF = 0

(3) AL = F1H; CF = 1; SF = 1

(4) AL = 1FH; CF = 1; SF = 1

35. Which of the following statement(s) regarding a linker software is/are true ?

I. A function of a linker is to combine several object modules into a single load module.

II A function of a linker is to replace absolute references in an object module by symbolic references to locations in other modules.

(1) Only I

(2) Only II

(3) Both I and II

(4) Neither I nor II

36. There are three processes P_1, P_2 and P_3 sharing a semaphore for synchronizing a variable. Initial value of semaphore is one. Assume that negative value of semaphore tells us how many processes are waiting in queue. Processes access the semaphore in following order :

(a) P2 needs to access

(b) P1 needs to access

(c) P3 needs to access

(d) P2 exits critical section

(e) P1 exits critical section

The final value of semaphore will be :

(1) 0

(2) 1

(3) –1

(4) –2

37. In a paging system, it takes 30 ns to search translation Look-a-side Buffer (TLB) and 90 ns to access the main memory. If the TLB hit ratio is 70%, the effective memory access time is :

(1) 48ns (2) 147ns

(3) 120ns (4) 84ns

38. Match the following w.r.t. Input/Output management :

	List – I		**List – II**
a.	Device controller	i.	Extracts information from the controller register and store it in data buffer
b.	Device driver	ii.	I/O scheduling
c.	Interrupt handler	iii.	Performs data transfer
d.	Kernel I/O subsystem	iv.	Processing of I/O request

Codes :

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

39. Which of the following scheduling algorithms may cause starvation ?

a. First-come-first-served

b. Round Robin

c. Priority

d. Shortest process next

e. Shortest remaining time first

(1) a, c and e (2) c, d and e

(3) b, d and e (4) b, c and d

40. Distributed operating systems consist of :

(1) Loosely coupled O.S. software on a loosely coupled hardware.

(2) Loosely coupled O.S. software on a tightly coupled hardware.

(3) Tightly coupled O.S. software on a loosely coupled hardware.

(4) Tightly coupled O.S. software on a tightly coupled hardware.

41. Software Engineering is an engineering discipline that is concerned with :

(1) how computer systems work.

(2) theories and methods that underlie computers and software systems.

(3) all aspects of software production

(4) all aspects of computer-based systems development, including hardware, software and process engineering.

42. Which of the following is not one of three software product aspects addressed by McCall's software quality factors ?

(1) Ability to undergo change

(2) Adaptiability to new environments

(3) Operational characteristics

(4) Production costs and scheduling

43. Which of the following statement(s) is/are true with respect to software architecture ?

S1 : Coupling is a measure of how well the things grouped together in a module belong together logically.

S2 : Cohesion is a measure of the degree of interaction between software modules.

S3 : If coupling is low and cohesion is high then it is easier to change one module without affecting others.

(1) Only S1 and S2

(2) Only S3

(3) All of S1, S2 and S3

(4) Only S1

44. The prototyping model of software development is :

(1) a reasonable approach when requirements are well-defined.

(2) a useful approach when a customer cannot define requirements clearly.

(3) the best approach to use for projects with large development teams.

(4) a risky model that rarely produces a meaningful product.

45. A software design pattern used to enhance the functionality of an object at run-time is :

(1) Adapter (2) Decorator

(3) Delegation (4) Proxy

46. Match the following :

	List – I		**List – II**
a.	Affiliate Marketing	i.	Vendors ask partners to place logos on partner's site. If customers click, come to vendors and buy.
b.	Viral Marketing	ii.	Spread your brand on the net by word-of-mouth. Receivers will send your information to their friends.
c.	Group Purchasing	iii.	Aggregating the demands of small buyers to get a large volume. Then negotiate a price.
d.	Bartering Online	iv.	Exchanging surplus products and services with the process administered completely online by an intermediary. Company receives "points" for its contribution.

Codes :

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

47. _____ refers loosely to the process of semi-automatically analyzing large databases to find useful patterns.

(1) Datamining (2) Data warehousing

(3) DBMS (4) Data mirroring

48. Which of the following is/are true w.r.t. applications of mobile computing ?

(A) Travelling of salesman

(B) Location awareness services

(1) (A) true; (B) false.

(2) Both (A) and (B) are true.

(3) Both (A) and (B) are false.

(4) (A) false; (B) true.

49. In 3G network, W-CDMA is also known as UMTS. The minimum spectrum allocation required for W-CDMA is _____.

(1) 2 MHz (2) 20 KHz

(3) 5 KHz (4) 5 MHz

50. Which of the following statements is/are true w.r.t. Enterprise Resource Planning (ERP) ?

(A) ERP automates and integrates majority of business processes.

(B) ERP provides access to information in a Real Time Environment.

(C) ERP is inexpensive to implement.

(1) (A), (B) and (C) are false.

(2) (A) and (B) false; (C) true.

(3) (A) and (B) true; (C) false.

(4) (A) true ; (B) and (C) are false.

_____

Space For Rough Work