PAPER-II
COMPUTER SCIENCE AND 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 87 14

Time : **1 $^{1}/_{4}$** hours] [Maximum Marks : **100**

Number of Pages in this Booklet : **8**

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 OMR Sheet Number should be entered on this Test Booklet.
4. Each item has four alternative responses marked (A), (B), (C) and (D). You have to darken the circle as indicated below on the correct response against each item.
   Example : (A) (B) ● (D)
   where (C) is the correct response.
5. Your responses to the items are to be indicated in the **OMR Sheet given inside the Paper I Booklet only.** If you mark 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 test question booklet and 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 and duplicate copy of OMR Sheet on conclusion of examination.
10. **Use only Blue/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 उसके कवर पेज 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 अर्थात् 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 OMR पत्रक की क्रम संख्या इस प्रश्न-पुस्तिका पर अंकित कर दें ।
4. प्रत्येक प्रश्न के लिए चार उत्तर विकल्प (A), (B), (C) तथा (D) दिये गये हैं । आपको सही उत्तर के वृत्त को पेन से भरकर काला करना है जैसा कि नीचे दिखाया गया है ।
   उदाहरण : (A) (B) ● (D)
   जबकि (C) सही उत्तर है ।
5. प्रश्नों के उत्तर **केवल प्रश्न पत्र I 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 प्रश्न-पुस्तिका एवं 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 तथा OMR पत्रक की डुप्लीकेट प्रति अपने साथ ले जा सकते हैं ।
10. **केवल नीले/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 AND APPLICATIONS
Paper – II

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

1. Infrared signals can be used for short range communication in a closed area using _____ propagation.
(A) ground (B) sky
(C) line of sight (D) space

2. A bridge has access to _____ address in the same network.
(A) Physical (B) Network
(C) Datalink (D) Application

3. The minimum frame length for 10 Mbps Ethernet is _____ bytes and maximum is _____ bytes.
(A) 64 & 128 (B) 128 & 1518
(C) 1518 & 3036 (D) 64 & 1518

4. The bit rate of a signal is 3000 bps. If each signal unit carries 6 bits, the baud rate of the signal is _____.
(A) 500 baud/sec
(B) 1000 baud/sec
(C) 3000 baud/sec
(D) 18000 baud/sec.

5. Match the following :

List – I	List – II
a. Physical layer	i. Allow resources to network access
b. Datalink layer	ii. Move packets from one destination to other
c. Network layer	iii. Process to process message delivery
d. Transport layer	iv. Transmission of bit stream
e. Application Layer	v. Formation of frames

Codes :

	a	b	c	d	e
(A)	iv	v	ii	iii	i
(B)	v	iv	i	ii	iii
(C)	i	iii	ii	v	iv
(D)	i	ii	iv	iii	v

6. A grammar G is LL(1) if and only if the following conditions hold for two distinct productions $A \rightarrow \alpha \mid \beta$
I. First (α) $\cap$ First (β) $\neq \{a\}$ where a is some terminal symbol of the grammar.
II. First (α) $\cap$ First (β) $\neq \lambda$
III. First (α) $\cap$ Follow (A) $= \phi$ if $\lambda \in$ First (β)
(A) I and II (B) I and III
(C) II and III (D) I, II and III

7. Which of the following suffices to convert an arbitrary CFG to an LL(1) grammar ?
(A) Removing left recursion alone
(B) Removing the grammar alone
(C) Removing left recursion and factoring the grammar
(D) None of the above

8. A shift reduce parser suffers from
(A) shift reduce conflict only
(B) reduce reduce conflict only
(C) both shift reduce conflict and reduce reduce conflict
(D) shift handle and reduce handle conflicts

9. The context free grammar for the language $L = \{a^n b^m c^k \mid k = |n - m|, n \geq 0, m \geq 0, k \geq 0\}$ is
(A) $S \rightarrow S_1S_3$, $S_1 \rightarrow aS_1c \mid S_2 \mid \lambda$, $S_2 \rightarrow aS_2b \mid \lambda$, $S_3 \rightarrow aS_3b \mid S_4 \mid \lambda$, $S_4 \rightarrow bS_4c \mid \lambda$
(B) $S \rightarrow S_1S_3$, $S_1 \rightarrow aS_1S_2c \mid \lambda$, $S_2 \rightarrow aS_2b \mid \lambda$, $S_3 \rightarrow aS_3b \mid S_4 \mid \lambda$, $S_4 \rightarrow bS_4c \mid \lambda$
(C) $S \rightarrow S_1 \mid S_2$, $S_1 \rightarrow aS_1S_2c \mid \lambda$, $S_2 \rightarrow aS_2b \mid \lambda$, $S_3 \rightarrow aS_3b \mid S_4 \mid \lambda$, $S_4 \rightarrow bS_4c \mid \lambda$
(D) $S \rightarrow S_1 \mid S_3$, $S_1 \rightarrow aS_1c \mid S_2 \mid \lambda$, $S_2 \rightarrow aS_2b \mid \lambda$, $S_3 \rightarrow a\,S_3b \mid S_4 \mid \lambda$, $S_4 \rightarrow bS_4c \mid \lambda$

10. The regular grammar for the language $L = \{w | n_a(w)$ and $n_b(w)$ are both even, $w \in \{a, b\}^*\}$ is given by :
(Assume, p, q, r and s are states)

(A) $p \to aq \mid br \mid \lambda$, $q \to bs \mid ap$
$r \to as \mid bp$, $s \to ar \mid bq$, p and s are initial and final states.

(B) $p \to aq \mid br$, $q \to bs \mid ap$
$r \to as \mid bp$, $s \to ar \mid bq$, p and s are initial and final states.

(C) $p \to aq \mid br \mid \lambda$, $q \to bs \mid ap$
$r \to as \mid bp$, $s \to ar \mid bq$
p is both initial and final states.

(D) $p \to aq \mid br$, $q \to bs \mid ap$
$r \to as \mid bp$, $s \to ar \mid bq$
p is both initial and final states.

11. KPA in CMM stands for

(A) Key Process Area
(B) Key Product Area
(C) Key Principal Area
(D) Key Performance Area

12. Which one of the following is not a risk management technique for managing the risk due to unrealistic schedules and budgets ?

(A) Detailed multi source cost and schedule estimation.
(B) Design cost
(C) Incremental development
(D) Information hiding

13. _____ of a system is the structure or structures of the system which comprise software elements, the externally visible properties of these elements and the relationship amongst them.

(A) Software construction
(B) Software evolution
(C) Software architecture
(D) Software reuse

14. In function point analysis, the number of complexity adjustment factors is

(A) 10 (B) 12
(C) 14 (D) 20

15. Regression testing is primarily related to

(A) Functional testing
(B) Development testing
(C) Data flow testing
(D) Maintenance testing

16. How many different truth tables of the compound propositions are there that involve the propositions p & q ?

(A) 2 (B) 4
(C) 8 (D) 16

17. A Boolean function F is called self-dual if and only if

$F(x_1, x_2, \ldots x_n) = F(\bar{x}_1, \bar{x}_2, \ldots \bar{x}_n)$

How many Boolean functions of degree n are self-dual ?

(A) 2^n (B) $(2)^{2^n}$
(C) $(2)^{n^2}$ (D) $(2)^{2^{n-1}}$

18. Which of the following statement(s) is (are) not correct ?

i. The 2's complement of 0 is 0.
ii. In 2's complement, the left most bit cannot be used to express a quantity.
iii. For an n-bit word (2's complement) which includes the sign bit, there are 2^{n-1} positive integers, 2^{n+1} negative integers and one 0 for a total of 2^n unique states.
iv. In 2's complement the significant information is contained in the 1's of positive numbers and 0's of the negative numbers.

(A) i & iv (B) i & ii
(C) iii (D) iv

19. The notation $\exists!xP(x)$ denotes the proposition "there exists a unique x such that $P(x)$ is true".
Give the truth values of the following statements :

I. $\exists!xP(x) \to \exists xP(x)$
II. $\exists!x \neg P(x) \to \neg\forall xP(x)$

(A) Both I & II are true.
(B) Both I & II are false.
(C) I – false, II – true
(D) I – true, II – false

20. Give a compound proposition involving propositions p, q and r that is true when exactly two of p, q and r are true and is false otherwise.

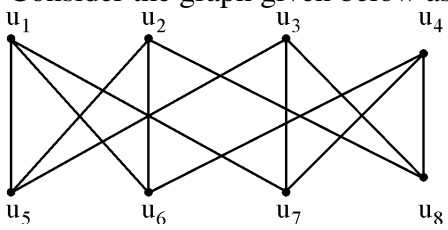
(A) $(p \vee q \wedge \neg r) \wedge (p \wedge \neg q \wedge r) \wedge (\neg p \wedge q \wedge r)$

(B) $(p \wedge q \wedge \neg r) \wedge (p \vee q \wedge \neg r) \wedge (\neg p \wedge q \wedge r)$

(C) $(p \wedge q \wedge \neg r) \vee (p \wedge \neg q \wedge r) \wedge (\neg p \wedge q \wedge r)$

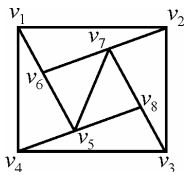
(D) $(p \wedge q \wedge \neg r) \vee (p \wedge \neg q \wedge r) \vee (\neg p \wedge q \wedge r)$

21. Consider the graph given below as :

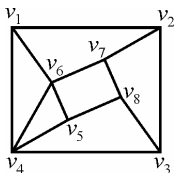


Which one of the following graph is isomorphic to the above graph ?

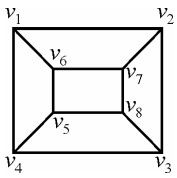
(A)



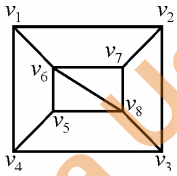
(B)



(C)



(D)



22. The upper bound and lower bound for the number of leaves in a B-tree of degree K with height h is given by :

(A) K^h and $2^{\lceil K/2 \rceil^{h-1}}$

(B) $K * h$ and $2^{\lfloor K/2 \rfloor^{h-1}}$

(C) K^h and $2^{\lfloor K/2 \rfloor^{h-1}}$

(D) $K * h$ and $2^{\lceil K/2 \rceil^{h-1}}$

23. Consider a complete bipartite graph $k_{m,n}$. For which values of m and n does this, complete graph have a Hamilton circuit

(A) $m = 3, n = 2$ (B) $m = 2, n = 3$

(C) $m = n \geq 2$ (D) $m = n \geq 3$

24. Big-O estimates for the factorial function and the logarithm of the factorial function i.e. n! and log n! is given by

(A) O(n!) and O(n log n)

(B) $O(n^n)$ and O(n log n)

(C) O(n!) and O(log n!)

(D) $O(n^n)$ and O(log n!)

25. How many cards must be chosen from a deck to guarantee that atleast

i. two aces of two kinds are chosen.

ii. two aces are chosen.

iii. two cards of the same kind are chosen.

iv. two cards of two different kinds are chosen.

(A) 50, 50, 14, 5 (B) 51, 51, 15, 7

(C) 52, 52, 14, 5 (D) 51, 51, 14, 5

26. Match the following with respect to the mobile computing technologies :

List – I	**List – II**
a. GPRS	i. An integrated digital radio standard
b. GSM	ii. 3G wireless/Mobile technology
c. UMTS	iii. Nine different schemes for modulation and error correction
d. EDGE	iv. An emerging wireless service that offers a mobile data

Codes :

	a	b	c	d
(A)	iii	iv	ii	i
(B)	iv	i	ii	iii
(C)	ii	iii	iv	i
(D)	ii	i	iv	iii

27. Object Request Broker (ORB) is

I. A software program that runs on the client as well as on the application server.

II. A software program that runs on the client side only.

III. A software program that runs on the application server, where most of the components reside.

(A) I, II & III (B) I & II

(C) II & III (D) I only

28. A software agent is defined as

I. A software developed for accomplishing a given task.

II. A computer program which is capable of acting on behalf of the user in order to accomplish a given computational task.

III. An open source software for accomplishing a given task.

(A) I

(B) II

(C) III

(D) All of the above

29. Match the following :

List – I	List – II
a. Classification	i. Principal component analysis
b. Clustering	ii. Branch and Bound
c. Feature Extraction	iii. K-nearest neighbour
d. Feature Selection	iv. K-means

Codes :

	a	b	c	d
(A)	iii	iv	ii	i
(B)	iv	iii	i	ii
(C)	iii	iv	i	ii
(D)	iv	iii	ii	i

30. SET, an open encryption and security specification model that is designed for protecting credit card transactions on the internet, stands for

(A) Secure Electronic Transaction

(B) Secular Enterprise for Transaction

(C) Security Electronic Transmission

(D) Secured Electronic Termination

31. In a paged memory management algorithm, the hit ratio is 70%. If it takes 30 nanoseconds to search Translation Look-aside Buffer (TLB) and 100 nanoseconds (ns) to access memory, the effective memory access time is

(A) 91 ns (B) 69 ns

(C) 200 ns (D) 160 ns

32. Match the following :

List – I	List – II
a. Multilevel feedback queue	i. Time-slicing
b. FCFS	ii. Criteria to move processes between queues
c. Shortest process next	iii. Batch processing
d. Round robin scheduling	iv. Exponential smoothening

Codes :

	a	b	c	d
(A)	i	iii	ii	iv
(B)	iv	iii	ii	i
(C)	iii	i	iv	i
(D)	ii	iii	iv	i

33. Consider a system with five processes P_0 through P_4 and three resource types R_1, R_2 and R_3. Resource type R_1 has 10 instances, R_2 has 5 instances and R_3 has 7 instances. Suppose that at time T_0, the following snapshot of the system has been taken :

Allocation

	R_1	R_2	R_3
P_0	0	1	0
P_1	2	0	0
P_2	3	0	2
P_3	2	1	1
P_4	0	2	2

Max

R_1	R_2	R_3
7	5	3
3	2	2
9	0	2
2	2	2
4	3	3

Available

R_1	R_2	R_3
3	3	2

Assume that now the process P_1 requests one additional instance of type R_1 and two instances of resource type R_3. The state resulting after this allocation will be

(A) Ready state (B) Safe state

(C) Blocked state (D) Unsafe state

34. Match the following :

List – I	List – II
a. Contiguous allocation	i. This scheme supports very large file sizes.
b. Linked allocation	ii. This allocation technique supports only sequential files.
c. Indexed allocation	iii. Number of disks required to access file is minimal.
d. Multi-level indexed	iv. This technique suffers from maximum wastage of space in storing pointers.

Codes :

	a	b	c	d
(A)	iii	iv	ii	i
(B)	iii	ii	iv	i
(C)	i	ii	iv	iii
(D)	i	iv	ii	iii

35. Which of the following commands will output "onetwothree" ?

(A) for val; do echo-n $val; done < one two three

(B) for one two three; do echo-n-; done

(C) for n in one two three; do echo-n $n; done

(D) for n in one two three {echo –n $ n}

36. Mergesort makes two recursive calls. Which statement is true after these two recursive calls finish, but before the merge step ?

(A) The array elements form a heap.

(B) Elements in each half of the array are sorted amongst themselves.

(C) Elements in the first half of the array are less than or equal to elements in second half of the array.

(D) All of the above

37. A text is made up of the characters α, β, γ, δ and σ with the probability 0.12, 0.40, 0.15, 0.08 and 0.25 respectively. The optimal coding technique will have the average length of

(A) 1.7 (B) 2.15

(C) 3.4 (D) 3.8

38. Searching for an element in the hash table requires O(1) time for the _____ time, whereas for direct addressing it holds for the _____ time.

(A) worst-case, average

(B) worst-case, worst-case

(C) average, worst-case

(D) best, average

39. An algorithm is made up of 2 modules M_1 and M_2. If time complexity of modules M_1 and M_2 are h(n) and g(n) respectively, the time complexity of the algorithm is

(A) min (h(n), g(n))

(B) max (h(n), g(n))

(C) h(n) + g(n)

(D) h(n) * g(n)

40. What is the maximum number of parenthesis that will appear on the stack at any one time for parenthesis expression given by

(( ) (( )) (( )))

(A) 2 (B) 3

(C) 4 (D) 5

41. Match the following :

List – I	List – II
a. Automatic storage class	i. Scope of the variable is global.
b. Register storage class	ii. Value of the variable persists between different function calls.
c. Static storage class	iii. Value stored in memory and local to the block in which the variable is defined.
d. External storage class	iv. Value stored in CPU registers.

Codes :

	a	b	c	d
(A)	iii	iv	i	ii
(B)	iii	iv	ii	i
(C)	iv	iii	ii	i
(D)	iv	iii	i	ii

42. When we pass an array as an argument to a function, what actually gets passed ?

(A) Address of the array

(B) Values of the elements of the array

(C) Base address of the array

(D) Number of elements of the array

43. While (87) printf("computer");

The above C statement will

(A) print "computer" 87 times

(B) print "computer" 0 times

(C) print "computer" 1 times

(D) print "computer" infinite times

44. A friend function can be used to

(A) avoid arguments between classes.

(B) allow access to classes whose source code is unavailable.

(C) allow one class to access an unrelated class.

(D) None of the above

45. Which of the following is the correct value returned to the operating system upon the successful completion of a program ?

(A) 0

(B) 1

(C) – 1

(D) Program do not return a value.

46. Manager's salary details are hidden from the employee. This is called as

(A) Conceptual level data hiding

(B) Physical level data hiding

(C) External level data hiding

(D) Local level data hiding

47. Which of the following statements is false ?

(A) Any relation with two attributes is in BCNF.

(B) A relation in which every key has only one attribute is in 2NF.

(C) A prime attribute can be transitively dependent on a key in 3NF relation.

(D) A prime attribute can be transitively dependent on a key in BCNF relation.

48. A clustering index is created when _____.

(A) primary key is declared and ordered

(B) no key ordered

(C) foreign key ordered

(D) there is no key and no order

49. Let R ={A, B, C, D, E, F} be a relation schema with the following dependencies $C \rightarrow F$, $E \rightarrow A$, $EC \rightarrow D$, $A \rightarrow B$

Which of the following is a key for R ?

(A) CD (B) EC

(C) AE (D) AC

50. Match the following :

List – I	List – II
a. DDL	i. LOCK TABLE
b. DML	ii. COMMIT
c. TCL	iii. Natural Difference
d. BINARY Operation	iv. REVOKE

Codes :

	a	b	c	d
(A)	ii	i	iii	iv
(B)	i	ii	iv	iii
(C)	iii	ii	i	iv
(D)	iv	i	ii	iii

Space For Rough Work

UGC – NET EXAM JUNE 2014
KEYS – PAPER 2

Subject (87) COMPUTER SCIENCE AND APPLICATION

Qno	Answer
1	C
2	A
3	D
4	A
5	A
6	D
7	D
8	C
9	D
10	C
11	A
12	D
13	C
14	C
15	D
16	D
17	D
18	C
19	A
20	D
21	C
22	A
23	C
24	B
25	A
26	B
27	D
28	B
29	C
30	A
31	D
32	D
33	B
34	B
35	C
36	B
37	B
38	C
39	B
40	B
41	B
42	C
43	D
44	C
45	A
46	C
47	D
48	A
49	B
50	D