TEST SERIES UGC-NET/JRF Jan. 2017

BOOKLET SERIES E

Paper Code 87

Test Type: TEST SERIES

Paper I & II

COMPUTER SCIENCE & APPLICATIONS

Duration: 02:30 Hours

Date: 15-01-2017

Maximum Marks: 200

Read the following instructions carefully:

1. **Paper-I** consists of 60 questions, out of 60 questions, 50 questions needs to be answered.
2. **Paper-II: 50 Q.** Each question carry **2(Two)** Marks.
3. There will be no negative marking.
4. Darken the appropriate bubbles with HB pencil/Ball Pen to write your answer.
5. For rough work, blank sheet is attached at the end of test booklet.
6. The candidates shall be allowed to carry the Question Paper Booklet after completion of the exam.

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PAPER-I

1. For directing students attention a teacher should
   (a) start the lecture with a puzzle picture or cartoon on a slide to focus on the day's topic
   (b) elicit student questions and concerns at the beginning of the class and list them on chalk board to be answered during the hour
   (c) only (a)
   (d) both (a) and (b)

2. Educational philosophy tells us what type of education should be imparted and why? On the other hand, the relationship of educational psychology is with the aspect of
   (a) "when and how" (b) "when and till what time"
   (c) "to whom and why" (d) all of these

3. Teaching will be more impressive if the teacher
   (a) is subject specialist
   (b) is more experienced in teaching that subject.
   (c) starts the topic from the point where the students have past knowledge
   (d) uses audio-video teaching aids

4. To encourage the students to become self-motivated independent learners, a teacher can
   (a) give frequent posture feedback that support students belief that they can do well
   (b) ensure opportunities for students success by assigning task
   (c) create an atmosphere that is open and positive
   (d) All of the above

5. Effective learning in the classroom depends on:
   (a) teacher's ability to maintain the interest (b) by coming prepared before hand
   (c) through lectures (d) none of these

6. Emotional Adjustment of students is effective in-
   (a) Personality formation (b) Class-teaching
   (c) Discipline (d) All of the above

7. Which one of the following statement is incorrect?
   (a) All researchers contribute to the existing knowledge
   (b) A good researcher is a always rational
   (c) One research gives birth to another
   (d) A researcher is expected to be well-read person

8. A good work of a research is the product of
   (a) collective scholarship (b) a good research library
   (c) a penetrating and analytical mind (d) a touch of genius

9. In order to produce a quality of research, it depends on
   (a) use of high technology (b) available facilities
   (c) training in Research Methodology (d) dedication the part of researchers

10. A type of research paper is
    (a) an analytical paper (b) an argumentative
    (c) Descriptive (d) All of the above

11. T.A.T. (in research) stands for
    (a) Thesis Applied Technology (b) Teacher Apprehension Test
    (c) Teaching Aptitude Test (d) Thematic Appreciation Test

12. When referencing other works you have cited within the text of the report you should
(a) State the first and last name of the author (b) Use the author, date citation method
(c) Use an asterisk and a footnote (d) Insert the complete citation in parenthesis

Direction (Q13-18):Read the following passage and answer the question.

What is immediately needed today is the establishement of a Wrold Government or an International Federation of mankind. It is the utmost necessity of the world today, and all those persons who wish to see all human beings happy and prosperous naturally feel it keenly. Of course, at times we feel that many of the problem of our political, social, linguistic and cultural life would come to an end if there were one Govenment all ovet the world. Travellers, businessmen, seekers of knowledge and teachers of righteousness knowvery well that great impediments and obstructions are faced by them when they pass from one country to another, exchange goods, get information, and make an efforts to spread their good gospel among their fellow-men. In the past, religious sects divided one set of people against another, colour of skin or shape of the body set one against the other.

But today when philosophical light has exploded the darkness that was created by religious differences, and when scientific knowledge has flasified the superstitions, they have enabled human beings of all religious views and of all races and colours to come in frequent contactwith one another . It is the governments of various countries that keep poeple of one country apart from, those of another. They create artificial barriers, unnatural distinctions, unhealthy isolation, unnecessary fears and dangers in theminds of common menwho by their naturewant to live in friendshipwith their fellow-men.But all these evilswould cease to exist if there were one Government all over the world.

13. What divides people of a country against another?
(a) Different religions (b) Different language
(c) Different social and political systems of different people
(d) Government of various countries

14. What is the urgent need of the world today?
(a) The establishment of an international economic order.
(b) The establishment of a world government.
(c) The creation of a cultural international social order.
(d) The raising of an international spiritual army.

15. What will the world Government be expected to do?
(a) it will arrange for interplanetary contacts
(b) it will end all wars for all time to come
(c) it will bring about a moral regeneration of mankind
(d) it will kill the evil spirit inman

16. Choose the word which is SIMILAR in meaning as the word "righteousness" as used in the passage.
(a) rectitude (b) religiosity
(c) requirement (d) scrupulousness

17. Which of the following problems has not been mentioned in the passage as likely to be solved with the establishment of world Government?
(a) Social Problems (b) Political Problems
(c) Cultural Problems (d) Economic Problems

18. Choose the word which is most OPPOSITE in meaning of the word 'impledíments' as used in the passage.
(a) handicaps (b) furtherance (c) providence (d) hindrances

19. Which of the following language was “Amrita Bazar Patrika” first published before changing over to English language?
(a) Bangla (b) Urdu (c) Sanskrit (d) Punjabi

20. What is the meaning of circulation in the parlance of the print media?
(a) number of copies printed (b) number of copies sold
(c) number of editions (d) All the above

21. Bombay and Calcutta stations inaugurated by the Indian Broadcasting Company in _____ ?
(a) 1927 (b) 1929 (c) 1930 (d) 1935

22. In the current litigation-prone environment, business communicators often use which type of language to convey critical messages without exposing themselves to lawsuits?
(a) Strategic ambiguity (b) Low-level abstractions
(c) Trigger words (d) Biased language

23. Rapport talk refers to talk designed to:
(a) Create connections (b) Establish goodwill
(c) Show support (d) All of these

24. Which of the following is not an advantage of grapevine communication?
(a) The grapevine creates a sense of unity among the employees who share and discuss their views with each other. Thus, grapevine helps in developing group cohesiveness.
(b) The grapevine serves as an emotional supportive value.
(c) The grapevine is a supplement in those cases where formal communication does not work.
(d) The grapevine is not trustworthy always as it does not follows official path of communication and is spread more by gossips and unconfirmed report.

25. 2, 5, 14, 41, 122?
(a) 563 (b) 365 (c) 635 (d) 536

26. AEI, CGK, ..., GKO, IMQ
(a) EIM (b) EIN (c) DHL (d) EJM

27. If 9th March of 1996 is a Saturday, then the 9th March of 1997 is a
(a) Wednesday (b) Tuesday (c) Sunday (d) Monday

28. If the side of a square is changed by 20% then the area will be changed by
(a) 44% (b)40% (c) 20% (d) None of these

29. In a group there are 5 females and 5 males. In how many ways a committee of 5 can be created so that there is atleast 1 male and 1 female in the committee?
(a) 50 (b) 200 (c) 250 (d) none of these

30. 5 persons can prepare an admission list in 8 days working 7 hours a day. If 2 persons join them so as to complete the work in 4 days, they need to work per day for:
(a) 9 hours (b) 8 hours (c) 12 hours (d) 10 hours

31. ***Directions:*** In the questions, there are two statements given followed by four conclusions numbered I, II, III and IV. You have to take the two given statements to be true even if they seen to be at variance from commonly known facts. Read all the conclusions and then decide which of the given conclusions logically follows from the statements.

Statements:
Some parcels are pencils.
All pencils are rubber.

Conclusions:
I. All rubbers are pencils. II. Some rubbers are pencils.
III. Some rubbers are parcels. IV. Some parcels are rubber.
(a) All follow (b) Only II, III and IV follows
(c) Only III and IV follow (d) Only I, II and III follows

32. Which of the following types of claims are correctly called "affirmative"?
(a) A and I (b) I and O (c) E and A (d) O and E

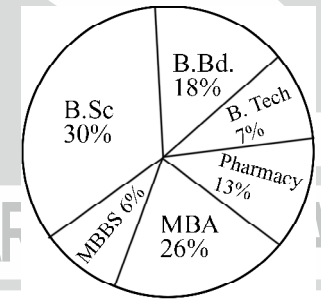
33. Which of the following is the best definition of "equivalent categorical claims"?
(a) Two claims are equivalent if they have the same subject or predicate terms.
(b) Two claims are equivalent if they have the same subject and predicate terms.
(c) Two claims are equivalent if and only if they would be true in exactly the same situations.
(d) Two claims are equivalent if and only if they have the same subject and predicate terms.

34. Which of the following is true of contrary claims?
(a) They always have opposite truth values.
(b) They can both be false but they can't both be true.
(c) They can both be true and false.
(d) They can both be true but they can't both be false.

35. Which of the following statements concerning the nature of critical thinking is most accurate?
(a) Critical thinking is about helping others and ourselves.
(b) Critical thinking is about helping others.
(c) Critical thinking is about attacking others.
(d) Critical thinking is about self debasement.

36. Which of the following is the best definition of validity?
(a) An argument is valid if its premises are true.
(b) An argument is valid if its conclusion is true.
(c) An argument is valid if its premises are true and its conclusion is true.
(d) An argument is valid if and only if the truth of its premises guarantees the truth of the conclusion.

Directions (37–41): Study the following Pie-chart carefully to answer these questions.
Total Students = 6500
Percentage distribution of Students in different courses



37. What is the value of **half** of the difference between the number of students in MBA and MBBS ?
(a) 800 (b) 1600 (c) 1300 (d) 650

38. How much more percentage **(approximately)** of students are in MBA as compared to students in B.Ed.?
(a) 49 (b) 53 (c) 44 (d) 41

39. What is the total number of students in B.Ed., Pharmacy and MBBS together?
(a) 2465 (b) 2565 (c) 2405 (d) 2504

40. What is the respective ratio between the number of students in Pharmacy and the number of students in B.Tech?
(a) II : 13 (b) 13 : 6 (c) 13 : 7 (d) 6 : 13

41. Number of students in B.Sc. is **approximately** what percentage of the number of students in B.Ed.?
(a) 167 (b) 162 (c) 157 (e) 153

42. A large-scale map depicts:
(a) a large amount of detail for a large amount of area
(b) a large amount of detail for a small amount of area
(c) a small amount of detail for a large amount of area
(d) a small amount of detail for a small amount of area

INFORMATION AND COMMUNICATION TECHNOLOGY (ICT)

43. Which one of the following network types will play an important role in implementing E-commerce?
(a) Local area network (b) Wireless local Area network
(c) Value-added network (d) Internet Service Provider's network

44. What type of telecommunications hardware allows you to access the web?
(a) Browser (b) Modem
(c) FTP protocol (d) IRC

45. Which is not part of an expert system architecture.
(a) Knowledge based (b) Computing environment
(c) Inference engine (d) End user interface

46. In a Mouse, there are three rollers that can rotate. How many rollers are actually responsible for the movement of the curser?
(a) One (b) Two (c) Three (d) None

47. The answer sheets in most examinations require the candidates to answer by marking the correct choice. This kind of data is converted into computer readable form through:
(a) Optical Character Reader (OCR) (b) Optical Mark Reader (OMR)
(c) Magnetic Ink Character Reader (MICR) (d) None of the above

48. Which of the following identifies a specific web page and its computer on the Web?
(a) Web site (b) web site address (c) URL (d) Domain Name

49. Which of the following gas was caused to the Bhopal gas tradegy
(a) Methyl isocyanate (b) Sodium isothiocyanate
(c) Ethyl isothiocynate (d) Pheny isocyanate and phosgene

50. The increasing amount of carbon dioxide in the air is slowly raising the temperature of the atmosphere, because it absorbs
(a) the water vapour of the air and retains its heat
(b) the UV part of the solar radiation
(c) all the solar radiations
(d) the infrared part of the solar radiation

51. What are the reasons for the people's resistance to the introduction of BT brinjal in India?
1. BT brinjal has been created by inserting a gene from a soil fungus into its genome.
2. the seeds of BT brinjal are terminator seeds and therefore, the farmers have to buy the seeds before every season from the seed companies.
3. there is an apprehension that the consumption of BT brinjal may have adverse impact on health.
4. there is some concern that the introduction of BT brinjal may have adverse effect on the biodiversity.
Which of the above are correct
(a) 1, 2 and 3 only (b) 2 and 3 only (c) 3 and 4 only (d) 1,2,3 and 4

52. Consider the following protected areas:
1. Bandipur 2. Bhitarkanika 3. Manas 4. Sunderbans
Which of the above are declared Tiger Reserves?
(a) 1 and 2 only (b) 1, 3 and 4 only (c) 2, 3 and 4 only (d) 1, 2, 3 and 4

53. In which one among the following categories of protected areas in India are local people not allowed to collect and use the biomass?
(a) Biosphere reserves (b) National parks
(c) Wetlands declared under Ramsar convention (d) Wildlife sanctuaries

54. Which region of India receives rainfall due to western disturbance in winter?
(a) Eastern region (b) North-western region
(c) Central region (d) Western region

55. In India other than ensuring that public funds are used efficiently and for intended purpose what is the importance of the office of the CAG?
1. CAG exercises exchequer control on behalf of the parliament when the president of India declares national emergency/ financial emergency
2. CAG reports on the execution of projects or programmes by the ministries are discussed by the PAC.
3. Information form CAG reports can be used by investigating agencies to press charges against those who have violated the law while managing public finances.
4. While dealing with audit and accounting of govt. companies. CAG has certain judicial powers for prosecuting those who violate the law.

Which of the above are correct?
(a) 1, 3 and 4 only (b) 2 only (c) 2 and 3 only (d) 1, 2, 3 and 4

56. The Prime Minister of India, at the time of his/ her appointment
(a) need not necessarily be a member of one of the Houses of the Parliament but must become a member of one of the Houses within six months
(b) need not necessarily be a member of one of the Houses of the Parliament but must become a member of the Lok Sabha within six months
(c) must be a member of one of the Houses of the parliament
(d) must be a member of the Lok Sabha

57. Which of the following was not constituted in the recommendations of National Policy on Education - 1986.
(a) Training of guardians (b) Training of teachers
(c) Expansion of institutions (d)Redesigning courses.

58. Which of the following are mandates of UGC?
(a) Promoting and coordinating university education.
(b) Determining and maintaining standards of teaching, examination and research in universities.
(c) Framing regulations on minimum standards of education.
(d) All of these

59. According to the Constitution of India, it is the duty of the President of India to cause to be laid before the Parliament which of the following?
1. The Recommendations of the Union Finance Commission
2. The Report of the Public Accounts Committee
3. The Report of the Comptroller and Auditor General
4. The Report of the National Commission for the Scheduled Castes

Select the correct answer the using the codes given below:
(a) 1 only (b) 2 and 4 only (c) 1, 3 and 4 only (d) 1, 2, 3 and 4

60. Information and Library Network Centre, INFLIBNET is situated at...
(a) Delhi (b) Bangluru (c) Gandhinagar (d) None of these

PAPER-II

1. Classification problems are distinguished from estimation problems in that
(a) classification problems require the output attribute to be numeric.
(b) classification problems require the output attribute to be categorical.
(c) classification problems do not allow an output attribute.
(d) classification problems are designed to predict future outcome.

2. Assume that we have a dataset containing information about 200 individuals. One hundred of these individuals have purchased life insurance. A supervised data mining session has discovered the following rule:

IF age < 30 & credit card insurance = yes
THEN life insurance = yes
Rule Accuracy: 70%
Rule Coverage: 63%

How many individuals in the class *life insurance= no* have credit card insurance and are less than 30 years old?
(a) 63 (b) 70 (c) 30 (d) 27

3. Consider the following relational query on the above database:

```
SELECT S.sname FROM Suppliers S
WHERe S.sid NOT IN (SELECT C.sid
                    FROM Catalog C
                    WHERE C.pid NOT IN(select P.pid
                    FROM Parts P
                    WHERE P.color <> 'blue'))
```

Assume that relations corresponding to the above schema are not empty. Which one of the following is correct interpretation of the above query?
(a) Find the names of all suppliers who have supplied a non-blue part
(b) Find the names of all suppliers who have not supplied a non-blue part
(c) Find the names of all suppliers who have supplied only blue parts
(d) Find the names of all suppliers who have not supplied only blue parts

4. Consider the relation given below and find the maximum normal form applicable to them

1. R(A, B) with productions $\{A \rightarrow B\}$
2. R(A, B) with productions $\{B \rightarrow A\}$
2. R(A, B) with productions $\{A \rightarrow B, B \rightarrow A\}$
3. R(A, B, C) with productions $\{A \rightarrow B, B \rightarrow A, AB \rightarrow C\}$

(a) 1, 2 and 3 are in 3NF and 4 is in BCNF (b) 1 and 2 are in BCNF and 3 and 4 are in 3NF
(c) All are in 3NF (d) All are in BCNF

5. Which of the following best differentiates between a data mining approach to problem-solving and an expert systems approach?
(a) The output of an expert system is a set of rules and the output of a data mining technique is a decision tree.
(b) A data mining technique builds a model without the aid of a human expert whereas an expert system is built from the knowledge provided by one or more human experts.
(c) A model built using a data mining technique can explain how decisions are made but an expert system cannot.
(d) An expert system is built using inductive learning whereas a data mining model is built using one or several deductive techniques.

6. What in multiprogramming OS provides a foolproof method of implementing memory protection to avoid program interference?
(a) Direct Memory Access (b) Privileged mode (c) Memory Protection (d) Both 2 and 3

7. Which of the following special shell variables is used to process number of the last background job?
(a) $! (b) $# (c) $0 (d) $*

8. A monitor is characterized by :
(a) a set of programmer defined operators (b) an identifier
(c) the number of variables in it (d) All of these

9. A virtual memory system uses First In First Out (FIFO) page replacement policy and allocates a fixed number of frames to a process. Consider the following statements:
P: Increasing the number of page frames allocated to a process sometimes increases the page fault rate.
Q: Some programs do not exhibit locality of reference. Which one of the following is TRUE?
(a) Both P and Q are true, and Q is the reason for P
(b) Both P and Q are true, but Q is not the reason for P.
(c) P is false, but Q is true (d) Both P and Q are false.

10. What is role of base/bound registers ?
(a) They give starting address to a program
(b) Program's addresses are neatly confined to space between the base and the bound registers
(c) They provide encrypted environment
(d) This technique doesn't protects a program's address from modification by another user

11. Which of the following is true about virtual functions in C++.
(a) Virtual functions are functions that can be overridden in derived class with the same signature.
(b) Virtual functions enable run-time polymorphism in a inheritance hierarchy
(c) If a function is 'virtual' in the base class, the most-derived class's implementation of the function is called according to the actual type of the object referred to, regardless of the declared type of the pointer or reference. In non-virtual functions, the functions are called according to the type of reference or pointer.
(d) All of the above

12. Which of the following is an advantage of putting presentation information in a separate CSS file rather than in HTML itself?
(a) The content becomes easy to manage
(b) Becomes easy to make site for different devices like mobile by making separate CSS files
(c) CSS Files are generally cached and therefore decrease server load and network traffic.
(d) All of the above

13. Which one of the following is a valid declaration of an applet?
(a) Public class MyApplet extends java.applet.Applet {
(b) public Applet MyApplet {
(c) public class MyApplet extends applet implements Runnable {
(d) public class MyApplet extends java.applet.Applet {

14. During a class inheritance in CPP, if the visibility mode or mode of derivation is not provided, then by default visibility mode is
(a) public (b) protected (c) private (d) Friend

15. Only functions of the class can access the data of the class and they(functions) provides the interface between data, objects and the program. This kind isolation of the data from direct access by the program is called
(a) Data Abstraction (b) Data Hiding (c) Data Binding (d) Data Encapsulation

16. Let A, B, C be arbitrary sets

(1) $(A - B) - C = A - (B \cup C)$ (2) $(A - B) - C = (A - C) - B$

(3) $(A - B) - C = (A - C) - (B - C)$

Which of the above statements are true?

(a) 1, 2 only (b) 1, 2, 3 (c) 2, 3 only (d) 1, 3 only

17. A realation "is less than" on real number is

(a) Equivalence relation (b) Transitive relation only

(c) Partially ordered relation (d) Symmetric relation only

18. Which of the following statements is/are TRUE for undirected graphs?

P: Number of odd degree vertices is even.

Q: Sum of degrees of all vertices is even.

(a) P only (b) Q only (c) Both P and Q (d) Neither P nor Q

19. Consider a company that assembles computers. The probability of a faulty assembly of any computer is p. The company therefore subjects each computer to a testing process.This testing process gives the correct result for any computer with a probability of q. What is the probability of a computer being declared faulty?

(a) pq + (1 – p)(1 – q) (b) (1 – q) p

(c) (1 – p) q (d) pq

20. Select the developer specific requirement ?

(a) Potability (b) Maintainability (c) Availability (d) Both (a) and (b)

21. Let R and S be relational schemes such that $R = \{a, b, c\}$ and $S = \{c\}$. Now consider the following queries on the database:

I. $\pi_{R-S}(r) - \pi_{R-S}\left(\pi_{R-S}(r) \times S - \pi_{R-S,S}(r)\right)$

II. $\left\{t \mid t \in \pi_{R-S}(r) \wedge \forall u \in s\left(\exists v \in r\left(u = v[s] \wedge t = v[R-S]\right)\right)\right\}$

III. $\left\{t \mid t \in \pi_{R-S}(r) \wedge \forall v \in r\left(\exists u \in s\left(u = v[s] \wedge t = v[R-S]\right)\right)\right\}$

IV. Select R.a, R.b
from R,S
where R.c=S.c

Which of the above queries are equivalent?

(a) I and II (b) I and III (c) II and IV (d) III and IV

22. _____ and _____ are the two issues of Requirement Analysis.

(a) Performance, Design (b) Stakeholder, Developer

(c) Functional, Non-Functional (d) none

23. If all tasks must be executed in the same time-span, what type of cohesion is being exhibited?

(a) Functional Cohesion (b) Temporal Cohesion

(c) Functional Cohesion (d) Sequential Cohesion

24. Which one is not a risk management activity?

(a) Risk assessment (b) Risk generation

(c) Risk control (d) None of the mentioned

25. Reverse engineering of data focuses on

(a) Internal data structures (b) Database structures

(c) ALL of the mentioned (d) None of the mentioned

26. The output expression for the Karnaugh map shown below is

A \ BC	00	01	11	10
0	1	0	0	1
1	1	1	1	1

(a) $A + \overline{B}$ (b) $A + \overline{C}$ (c) $\overline{A} + \overline{C}$ (d) $\overline{A} + C$

27. Which one of the following 8085 microprocessor programs correctly calculates the product of two 8-bit numbers stored in registers B and C ? "Assume data if needed".

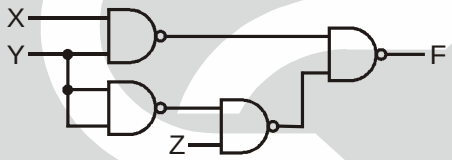
(a)
```
    MVI A, 00 H
    JNZ LOOP
    CMP C
LOOP DCR B
    HLT
```

(b)
```
    MVI, A, 00H
    CMP C
LOOP DCR B
    JNZ LOOP
    HLT
```

(c)
```
    MVI A, 00H
LOOP ADD C
    DCR B
    JNZ LOOP
    HLT
```

(d)
```
    MVI A, 00H
    ADD C
    JNZ LOOP
LOOP INR B
    HLT
```

28. In the digital circuit given below, F is



(a) $XY + Y\overline{Z}$ (b) $XY + \overline{Y}Z$ (c) $\overline{X}\overline{Y} + Y\overline{Z}$ (d) $XZ + \overline{Y}$

29. The 8085 assembly language instruction that stores the content of L and H registers into the memory locations 2050 H and 2051 H, respectively, is

(a) SPHL 2050 H (b) SPHL 2051 H (c) SHLD 2050 H (d) STAX 2050 H

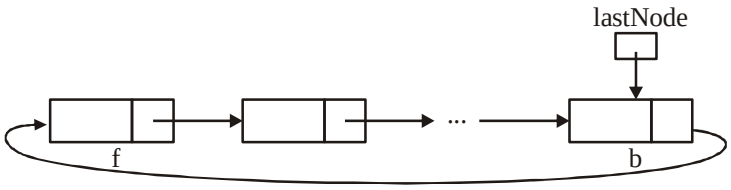
30. Consider the following :

1. Sign flag 2. Trap flag 3. Parity flag 4. Auxilliary carry flag

Which of the above flag is/are present in 8085 microprocessor ?

(a) 1 only (b) 1 and 2 (c) 2 and 3 (d) 1, 3 and 4

31. Suppose a queue is implemented with a circular linked list that has just one private instance variable, lastNode, that refers to the last element of the list:



In the diagram, f and b indicate the front and back of the queue. Which of the following correctly gives the run time of (1) add and (2) remove in this implementation?

(a) (1) O(n) (2) O(1) (b) (1) O(1) (2) O(n)

(c) (1) O(n) (2) O(n) (d) (1) O(1) (2) $O(n^2)$

32. Often the most efficient computer algorithms use a divide-and-conquer approach, for example, one in which a list is repeatedly split into two pieces until a desired outcome is reached. Which of the following use a divide-and-conquer approach?

I Mergesort
II Insertion sort
III Binary search

(a) I only (b) II only (c) III only (d) I and III only

33. A certain algorithm sequentially examines a list of *n* random integers and then outputs the number of times 8 occurs in the list. Using big-O notation, this algorithm is

(a) $O(1)$ (b) $O(\sqrt{n})$ (c) $O(n)$ (d) $O(n^2)$

34. The following key values are to be inserted into the hash table shown in the order given:

10 28 2 7 45 25 40 29

array index	0	1	2	3	4	5	6	7	8	9	10
key value											

The hash function is key % 11. Collisions will be resolved with the Open Addressing and Linear Probing ("has-and-search") method. Which array slot will 29 eventually occupy?

(a) 7 (b) 8 (c) 9 (d) 10

35. The (1) prefix and (2) postfix forms of the expression $P+(Q-R)*A/B$ are

(a) $(1)+P*-QR/AB$ $(2)\ PQR-AB/*+$

(b) $(1)\ PQR-AB/*+$ $(2)+P*-QR/AB$

(c) $(1)\ PQR-A*B/+$ $(2)+P/*-QRAB$

(d) $(1)+P/*-QRAB$ $(2)\ PQR-A*B/+$

36. Consider the following method:

```
public void doSomething(int n)
{
    if (n > 0)
    {
        doSomething(n – 1);
        System . out . print(n);
        doSomething(n – 1);
    }
}
```

What would be output following the call doSomething(3)?

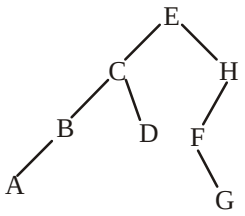
(a) 3211211 (b) 1121213 (c) 1213121 (d) 1211213

37. Let $G-(V, E)$ be a finite directed acyclic graph with $|E|>0$. Which of the following must be true?

I. G has a vetex with no incoming edge.
II. G has a vertex with no outgoing edge.
III. G has an isolated vertex, that is, one with neither an incoming edge nor an outgoing edge.

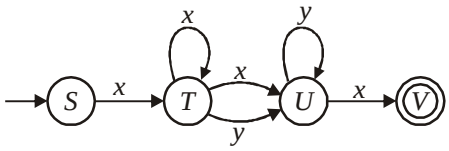
(a) I only (b) II only (c) III only (d) I and II only

38. In the binary search tree above, finding node E requires one comparison and finding node A requires four comparisons. What is the expected number of comparisons required to find a node chosen at random?



(a) 1.75 (b) 2 (c) 2.75 (d) 3

39. Consider the following nondeterministic finite state automaton over alphabet $\{x, y\}$ with start state S.



Which of the following is the regular expression corresponding to the automaton above?

(a) $xxx + yyx$ (b) x^3y^2x (c) x^*y^*x (d) $xx^*(x+y)y^*x$

40. $S \rightarrow A0B$

$A \rightarrow BB \mid 0$

$B \rightarrow AA \mid 1$

What is the number of terminal strings of length 5 generated by the context-free grammar shown above?

(a) 4 (b) 5 (c) 6 (d) 7 (e) 8

41. Which of the following statements is/are true?

I. There is a language L such that L is not recursive (L is undecidable), yet L and its complement are both recursively enumerable.

II. There is a language L such that L is not recursive, yet L is recursively enumerable.

III. Every language in NP is recursive

(a) None (b) II only (c) I and II only (d) II and III only

42. Consider the following pseudocode program.

```
int i
main ( )
{
    i = 3
    S ( )
    R ( )
}
void S ( )
{
    print i / / prints the value or i on the current line of output
    print " " / / prints a blank space on the current line of output
}
void R ( )
{
    int i
    i = 2
```

```
    S ( )
}
```

What is the output of the program if the pseudocode uses either static (lexical) scoping or dynamic scoping?

	Static Scoping	Dynamic Scoping
(a)	3 2	3 2
(b)	3 3	2 2
(c)	3 3	2 3
(d)	3 3	3 2

43. Given the following expression grammar:

$E \rightarrow E * F \mid F+E \mid F$

$F \rightarrow F\text{-}F \mid id$

Which of the following is true?

(a) * has higher precedence than + (b) – has higher precedence than *
(c) + and – have same precedence (d) + has higher precedence than *

44. A unix file system has 1 KB block size and 4-byte disk address. What is the maximum file size if the inode contain

1. 10 direct block entries
2. 1 single indirect block
3. 1 double indirect block and one triple indirect block entry.

(a) 64 GB (b) 16 GB (c) 30 GB (d) 1 GB

45. Which of the following commands will output "one-two-three".

(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}

46. A single-layer perception has 6 input units and 3 output units. How many weights does this network have?

(a) 6 (b) 9 (c) 18 (d) 25

47. A group of 15 routers are inter connected in a centralized complete binary tree with a router at each tree node. Router i communicates with router j by sending a message to the root of the tree. The root then sends the message back down to router j. Then mean number of hops per message, assuming all possible router pairs are equally likely is

(a) 3 (b) 4.26 (c) 4.53 (d) 5.26

48. The minimum frame size required for a CSMA/CD based computer network running at Gbps on a 200 m cable with a link speed of 2×10^8 m/s is:

(a) 125 bytes (b) 250 bytes (c) 500 bytes (d) None of the above

49. In communication satellite, multiple repeaters are known as?

(a) Detectors (b) Modulators (c) Stations (d) Transponders

50. Let R(ABCDEH) and $F = \langle A \rightarrow BC, CD \rightarrow E, E \rightarrow C, AH \rightarrow D \rangle$ which of the following is not correct.

(a) A and H are prime (b) B, C, D, E are non prime
(c) AH is only condidate key (d) DE is only candiate key

TEST SERIES UGC-NET/JRF Jan. 2017

BOOKLET SERIES E

Paper Code 87

Test Type: TEST SERIES

Paper III

COMPUTER SCIENCE & APPLICATIONS

Duration: 02:00 Hours

Date: 15-01-2017

Maximum Marks: 150

Read the following instructions carefully:

1 Attempt all the questions.

2. **Paper-III: 75Q.** Each question carry **2(Two)** Marks.

3. There will be no negative marking.

4. Darken the appropriate bubbles with HB pencil/Ball Pen to write your answer.

5. For rough work, blank sheet is attached at the end of test booklet.

6. The candidates shall be allowed to carry the Question Paper Booklet after completion of the exam.

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PAPER-III

1. Equilibrium value for the standard fuzzy complement is
(a) 0 (b) 0.5 (c) 1 (d) 0.4

2. If A and B are two fuzzy sets with membership functions
$\mu_A(X) = \{0.2, 0.5, 0.6, 0.1, 0.9\}$
$\mu_B(X) = \{0.1, 0.5, 0.2, 0.7, 0.8\}$
Then the value of $\mu_{A\cap B}$ will be
(a) {0.2, 0.5, 0.6, 0.7, 0.9} (b) {0.2, 0.5, 0.2, 0.1, 0.8}
(c) {0.1, 0.5, 0.6, 0.1, 0.8} (d) {0.1, 0.5, 0.2, 0.1, 0.8}

3. Concept class C_1 shows the following information for the categorical attribute Risk Factor.

Attribute Name	**Value**	**Frequency**
Risk factor	High Risk	25
	Medium Risk	10
	Low Risk	5

What is the predictability score for the attribute value *medium risk*?
(a) 0.10 (b) 0.20 (c) 0.25 (d) 0.50

4. A certain dataset contains two classes¾ *class A* and *class B*¾ each having 100 instances. RuleMaker generates several rules for each class. One rule for *class A* is given as
att1 = value1
covered = 20
remaining =60
What percent of the class A instances are covered by this rule?
(a) 20 (b) 40 (c) 60 (d) 70

5. **Let f be real valued function in x Let f be bounded from blow by int (f) and from above by sup (f). The fuzzy set** $m = \{(x, \mu_m(x))\}$ **xFx with** $\mu_m(x)$ **is**

(a) $\frac{f(x) - \text{int}(f)}{\text{Sup}(f) - \text{int}(f)}$ (b) $\frac{\text{Sup}(f) - \text{int}(f)}{f(x) - \text{int}(f)}$
(c) 0 (d) None of the above

6. The P and V operations on counting semaphores, where s is a counting semaphore, are defined as follows:
P(s) : s = s - 1;
if (s < 0) then wait;
V(s) : s = s + 1;
if (s <= 0) then wakeup a process waiting on s;
Assume that Pb and Vb the wait and signal operations on binary semaphores are provided. Two binary semaphores Xb and Yb are used to implement the semaphore operations P(s) and V(s) as follows:

```
P(s) :Pb(Xb);
s = s - 1;
if (s < 0) {
        Vb(Xb) ;
        Pb(Yb) ;
}
        elseVb(Xb);
        V(s) :Pb(Xb) ;
        s = s + 1;
if (s <= 0) Vb(Yb) ;
```

Vb(Xb) ;

The initial values of Xb and Yb are respectively

(a) 0 and 0 (b) 0 and 1 (c) 1 and 0 (d) 1 and 1

7. A system has 12 magnetic tape drives and 3 processes : P0, P1, and P2. Process P0 requires 10 tape drives, P1 requires 4 and P2 requires 9 tape drives.

Process
P0
P1
P2
Maximum needs (process-wise : P0 through P2 top to bottom)
10
4
9
Currently allocated (process-wise)
5
2
2

Which of the following sequence is a safe sequence ?

(a) P0, P1, P2 (b) P1, P2, P0 (c) P2, P0, P1 (d) P1, P0, P2

8. Consider a computer with 8 Mbytes of main memory and a 128 K cache. The cache block size is 4 K. It uses a direct mapping scheme for cache management. How many different main memory blocks can map onto a given physical cache block ?

(a) 2048 (b) 256 (c) 64 (d) 8

9. In indexed allocation :

(a) each file must occupy a set of contiguous blocks on the disk
(b) each file is a linked list of disk blocks
(c) all the pointers to scattered blocks are placed together in one location
(d) None of these

10. If the disk head is located initially at 32, find the number of disk moves required with FCFS if the disk queue of I/O blocks requests are 98, 37, 14, 124, 65, 67.

(a) 239 (b) 310 (c) 321 (d) 325

11. Object based language differs from object oriented language as it does not support features

(1) Encapsulation (2) Inheritance (3) Dyanmic Binding (4) Polymorphism

(a) Only 3, 4 (b) Only 1, 3 (c) 2, 4 (d) only 2, 3

12. In CPP, cin and cout are the predefined stream

(a) Operator (b) Functions (c) Objects (d) Data types

13. Which of the following is/are not keywords in CPP?

(1) asm (2) boolean (3) mutable (4) export
(5) constant_cast

(a) Only 5 (b) Only 1 and 4 (c) Only 1, 2 and 5 (d) Only 2 and 5

14. Which of the followings are false statements about Local class?

(1) A local class type name can only be used in the enclosing function
(2) All the methods of Local classes must be defined inside the class only
(3) A Local class can contain static data members.
(4) A Local class may contain static functions.
(5) Non-static variables of the enclosing function are not accessible inside local classes.
(6) Local classes cannot access global types, variables and functions.

(a) Only 1,3 (b) Only 3, 6 (c) Only 2 , 4 , 6 (d) None of these

15. In HTTP request which asks for the loopback of the request message, for testing and troubleshooting?

(a) Put (b) Options (c) Delete (d) Trace

16. Examples of Applications server from the following are?
(a) Apache (b) Tomcat (c) Boss (d) (b) and (c)

17. How can we resize the image in HTML?
(a) Using resizxe attribute (b) Using height width
(c) Using size attribute (d) Using rs attribute

18. Consider the set S = {1, 2, 3, ..., 25}. The number of subsets $T \subseteq S$ of size five such that T has at least one odd number in it is
(a) 52338 (b) 42338 (c) 25338 (d) 72338

19. Consider the following relation on subsets of the set S of integers between 1 and 2014. For two distinct subsets U and V of S we say U < V if the minimum element in the symmetric difference of the two sets is in U. Consider the following two statements:
S1: There is a subset of S that is larger than every other subset.
S2: There is a subset of S that is smaller than every other subset.
Which one of the following is CORRECT?
(a) Both S1 and S2 are true (b) S1 is true and S2 is false
(c) S2 is true and S1 is false (d) Neither S1 nor S2 is true

20. Consider following definitions and an English statement :
p : File is received from internet
q : File is received from flash-drive
r : File is scanned for viruses
"If the file is received from the internet or a flash drive, then it is scanned for viruses."
Which of the following correctly represents the above statements?
(a) $(p \wedge q) \rightarrow r$ (b) $(p \rightarrow r) \wedge (q \rightarrow r)$ (c) Both (a) and (b) (d) $\sim r \rightarrow (\sim pv \sim q)$

21. How many subsets of a set of 10 apples contain at most 3 apples?
(a) 154 (b) 168 (c) 176 (d) 188

22. Consider a banking application which requires 25,700 LOC. If the productivity of a person in 450 loc per month, consider the salary of the developer is 400 per month, find the cost of the application?
(a)28500 (b) 22845 (c) 19485 (d) none

23. Consider a digital image processing application which contains 3 modules
M_1 = 35.4 KLOC M_2 = 11.5 KLOC M_3 = 25.4 KLOC
If the productivity of the developer is 3KLOC per month, find the effort required in person-month(pm)?
(a) 13.3 (b) 35.6 (c) 31.8 (d) none of these

24. Consider a DRDO application in the development, company predicts the size of the entire application as follows:
4600 KLOC optimistic
5900 KLOC most likely
7600 KLOC pessimistic
First calculate the predicated size using which find the productivity if the software development effort is 6 person month?
(a) 995 (b) 690 (c) 1050 (d) 549

25. Assume that the size of an organic type software product has been estimated to be 22,000 lines of source code. Assume that the average salary of software engineers be Rs. 15,000/- per month. Determine the effort required to develop the software product and the nominal development and cost time using basic ?(use a_b=2.4, b_b=1.05,c_b=2.5,d_b=.38) cocomo.
(a) E=91 TIME= 15
(b) E=78 TIME= 11
(c) E=91 TIME= 14
(d) E=118 TIME= 19

26. Find the initial basic feasible solution by North-West corner method

	1	2	3	4	Supply
A	3	1	7	4	250
B	2	6	5	9	350
C	8	3	3	2	400
Demand	200	300	350	150	

(a) 3800 (b) 3700 (c) 4000 (d) 3900

27. If the number of allocation is transportation problem is less than (rows + column – 1), then the problem is said to be

(a) degenerate (b) non-degenerate (c) not feasible (d) unbounded

28. Find the optimal cost of following assignment problem

	M_1	M_2	M_3	M_4
A	1	4	6	3
B	9	7	10	9
C	4	5	11	7
D	8	7	8	5

(a) 21 (b) 19 (c) 17 (d) 15

29. Maximize $4x_1 + 3x_2$

$x_1 + 4x_2 \le 3$; $3x_1 + x_2 \ge 12$; $x_1 x_2 \ge 0$

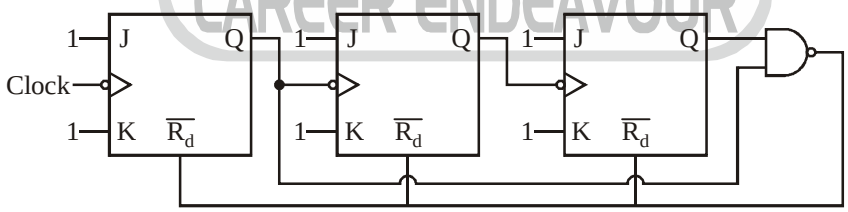
above solution is

(a) optimal (b) degenerate (c) unbounded (d) infeasible

30. The Boolean expression $\overline{(\bar{a} + \bar{b} + c + \bar{d}) + (b + \bar{c})}$ simplifies to

(a) 1 (b) $\overline{a \cdot b}$ (c) $a \cdot b$ (d) 0

31. The circuit shown consists of J-K flip flops, each with an active low asynchronous reset ($\overline{R_d}$ input) . The counter corresponding to this circuit is



(a) a modulo-5 binary up counter (b) a modulo-6 binary down counter
(c) a modulo-5 binary down counter (d) a modulo-6 binary up counter

32. A software delay subroutine is written as give below :

```
DELAY :  MVI H, 255 D
         MVI L, 255 D
LOOP :   DCR L
         JNZ LOOP
         DCR H
         JNZ LOOP
```

How many times DCR L instruction will be executed ?

(a) 255 (b) 510 (c) 65025 (d) 65279

33. The following instructions have been executed by an 8085 microprocessor.

Address (Hex)	**Instruction**
6010 H	LXI H, 8A79 H
6013 H	MOV A, L
6014 H	ADD H
6015 H	DAA
6016 H	MOV H, A
6017 H	PCHL

From which address will the next instruction be fetched ?

(a) 6018 H (b) 6379 H (c) 6979 H (d) None of these

34. Consider the method search And Stack.

```
//Precondition: v[0]...v[v. length-1] initialized with int values.
//                    Stack s is empty. value may or may not be in v.
public static void search And Stack (int [] v, Stack<Integer> s, int value)
{
    for (int i = 0; i < v.length; i++)
    {
        if (v[i] > value % 2)
            s . push(new Integer (v[i]));
        else
        {
            Integer x = s.pop ();
        }
    }
}
```

Suppose v initially contains 2 1 6 5 0 9, and search And Stack (v, s, 5) is invoked. Which of the following will be true after execution of the method?

(a) The stack will be empty.

(b) The stack will contain three elements with s.peekTop( ) equal to 9.

(c) The stack will contain two elements with s.peekTop( ) equal to 9.

(d) The stack will contain two elements with s.peekTop( ) equal to 6.

35. A large sorted array containing about 30,000 elements is to be searched for a value key using an iterative binary search algorithm. Assuming that key is in the array, which of the following is closest to the smallest number of iterations that will guarantee that key is found? Note: $10^3 \approx 2^{10}$.

(a) 15 (b) 30 (c) 100 (d) 300

36. Assume that array a[0]...a[6] = 6 1 5 9 8 4 7 is to be sorted in increasing order using heapsort. Which of the following represents the correct sequence of swaps to be made to form the array into the original heap?

(a)
6 1 7 9 8 4 5
6 9 7 1 8 4 5
9 6 7 1 8 4 5
9 8 7 1 6 4 5

(b)
6 9 5 1 8 4 7
6 9 7 1 8 4 5
9 6 7 1 8 4 5
9 8 7 1 6 4 5

(c)
6 1 7 9 8 4 5
7 1 6 9 8 4 5
7 9 6 1 8 4 5
9 7 6 1 8 4 5
9 8 6 1 7 4 5

(d)
6 9 5 1 8 4 7
9 6 5 1 8 4 7
9 6 7 1 8 4 5
9 8 7 1 6 4 5

37. Consider method foo:

```
public int foo (int x)
{
    if (x == 1 || x == 3)
        return x;
    else
        return x * foo (x – 1);
}
```

Assuming no possibility of integer overflow, what will be the value of z after execution of the following statement?

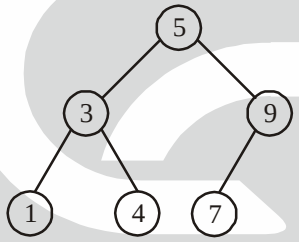
```
int z = foo(foo(3) = foo(4));
```

(a) $(15!)/(2!)$ (b) $3! + 4!$ (c) $(7!)!$ (d) $(3! + 4!)!$

38. Assume that any n-bit positive integer x is stored as a linked list of bits so that the first element of the list is the least significant bit. For example, $x = 14 = 1110_2$ is stored as the linked list (0, 1, 1, 1) of size $n = 4$. For this data structure, the operation that replaces x by $\left\lfloor \frac{x}{8} \right\rfloor$ can be done in

(a) $\Theta(1)$ steps (b) $\Theta(\log n)$ steps (c) $\Theta(n)$ steps (d) $\Theta(n \log n)$ steps

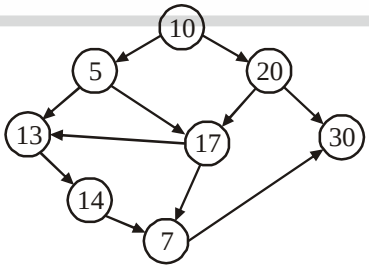
39. Consider the following binary search tree.



Starting from an empty binary search tree, the insertion of which of the following sequences of integer keys could produce the binary tree above?

(a) 5, 9, 1, 7, 3, 4 (b) 5, 7, 4, 9, 3, 1 (c) 5, 4, 7, 3, 9, 1 (d) 5, 3, 4, 9, 1, 7

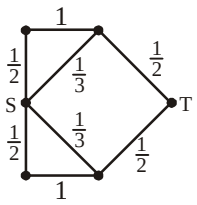
40. Consider the following directed graph



Which of the following is a topological sort of the nodes of the graph?

(a) 5, 7, 10, 13, 14, 17, 20, 30 (b) 10, 5, 13, 14, 7, 30, 17, 20
(c) 10, 5, 13, 17, 20, 14, 7, 30 (d) 10, 5, 20, 13, 17, 30, 14, 7

41. In the graph below, each edge label represents the probability that the connection between its endpoints is working. If these probabilities are mutually independent, what is the probability that there is a path of working edges from *S* to *T*?



(a) $\frac{1}{3}$ (b) $\frac{5}{12}$ (c) $\frac{5}{9}$ (d) $\frac{2}{3}$

42. If $T(0)=T(1)=1$, each of the following recurrences for $n \geq 2$ defines a function *T* on the nonnegative integers. Which of the following CANNOT be bounded by a polynomial function?

(a) $T(n)=3T(\lfloor n/2 \rfloor)+n^2$ (b) $T(n)=4T(\lfloor n/2 \rfloor)+n$

(c) $T(n)=T(\lfloor 7n/8 \rfloor)+8n+1$ (d) $T(n)=2T(n-2)+1$

43. To compute the matrix product M_1M_2 where $M_1 2$ has *p* rows and *q* columns and where M_2 has *q* rows and *r* columns, takes time proportional to *pqr*, and the result is a matrix of *p* rows and *r* columns. Consider the product of three matrices $N_1N_2N_3$ that have respectively, *w* rows and *x* columns, *x* rows and *y* columns and *y* rows and *z* columns. Under what condition will it take less time to compute the product as $(N_1N_2)N_2(N_1N_2)N_3$ (i.e., multiply the first two first) than to compute it as $N(N_2N_3)$?

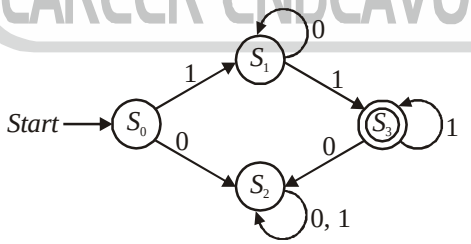
(a) There is no such condition i.e., they will always take the same time

(b) $\frac{1}{x}+\frac{1}{z}<\frac{1}{w}+\frac{1}{y}$

(c) $x > y$

(d) $\frac{1}{w}+\frac{1}{x}<\frac{1}{y}+\frac{1}{z}$

44. The graph below represents a finite state machine.



Which of the following regular expressions describes the set of strings recognized by the finite state machine?

(a) 10*1 (b) 10*1* (c) $10*1^+$ (d) (0 + 1)* (e) 0*(0 + 1)*0*

45. Consider a regular language L over {0, 1}. Which of the following languages over {0, 1} must also be regular?

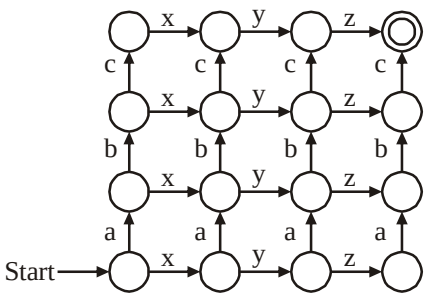
I. $\{W \in L \mid \text{the length of } W \text{ is even}\}$

II. $\{W \in L \mid \text{the length of } W \text{ is prime}\}$

III. $\{W \in L \mid \text{the length of } W \text{ is an integer power of 2}\}$

(a) None (b) I only (c) III only (d) I and III only

46. The finite automation below recognizes a set of strings of length 6. What is the total number of strings in the set?



(a) 18 (b) 20 (c) 30 (d) 32

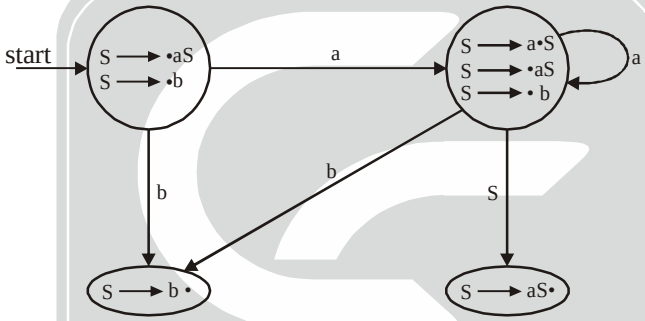
47. The number of equivalence classes according to My-Hill Nerode theorem for the following Language

$L = \{a^n b^n c^n \mid n >= 0\}$

(a) n (b) n + 1 (c) n + 3 (d) none of these

48. $S \rightarrow aS|b$

The "parsing automaton" below is for the context free grammar with the productions indicated above.



Each state includes certain "items", which are productions with dots in their right sides. The parser using this automaton, with X1 X2...Xn on the stack, reduces by production A'? If and only if there is a path, labeled X1 X2...Xn from the start state to a state that includes the item A'? (note the dot at the right end). Which of the following stack contents causes the parser to reduce by some production?

(a) a (b) aa (c) bb (d) aaS

49. Consider the grammar with the following translation rules and E as the start symbol.

$E \rightarrow E1 \#T$ {E.value = E1.value * T.value}

$E \rightarrow T$ {E.value = T.value}

$T \rightarrow T1$ and F {T.value = T1.value + F.value}

$T \rightarrow F$ {T.value = F.value}

$F \rightarrow$ num {F.value = num.value}

Compute E.value for the root of the parse tree for the expression:2 # 3 and 5 # 6 and 4.

(a) 200 (b) 180 (c) 160 (d) 40

50. For the grammar below, a partial LL(1) parsing table is also pressented along with the grammar. Entries that need to be filled are indicated as E1, E2, and E3, is the empty string, $ indicates end of input, and, | separates alternate right hand sides of productions.

$S \rightarrow a\ A\ b\ B \mid b\ A\ a\ B \mid \varepsilon$

$A \rightarrow S$

$B \rightarrow S$

	a	b	S
S	E1	E2	$S \rightarrow \varepsilon$
A	$A \rightarrow S$	$A \rightarrow S$	error
B	$B \rightarrow S$	$B \rightarrow S$	E3

(a) $\text{FIRST}(A) = \{a, b, \varepsilon\} = \text{FIRST}(B)$
$\text{FOLLOW}(A) = \{a, b\}$
$\text{FOLLOW}(B) = \{a, b, \$\}$

(b) $\text{FIRST}(A) = \{a, b, \$\}$
$\text{FIRST}(B) = \{a, b, \varepsilon\}$
$\text{FOLLOW}(A) = \{a, b\}$
$\text{FOLLOW}(B) = \{\$\}$

(c) $\text{FIRST}(A) = \{a, b, \varepsilon\} = \text{FIRST}(B)$
$\text{FOLLOW}(A) = \{a, b\}$
$\text{FOLLOW}(B) = \varnothing$

(d) $\text{FIRST}(A) = \{a, b\} = \text{FIRST}(B)$
$\text{FOLLOW}(A) = \{a, b\}$
$\text{FOLLOW}(B) = \{a, b\}$

51. Consider a Binary Symmetric Channel (BSC) with probability of error being p. to transmit a bit say 1, we transmit a sequence of three sequence to represent 1 if at least two bits bit will be represent in error is

(a) $p^3 + 3p^2(1-p)$ (b) $(1-p)^3$ (c) p^3 (d) $p^3 + p^2(1-p)$

52. Which of the following statements is always true?

(a) If $H(X \mid Y) = H(X) - H(Y)$ then X and Y are independent.

(b) If $H(X \mid Y) = 0$ then X and Y are independent.

(c) If the mutual information $I(X; Y)$ is zero then X and Y are independent.

(d) If $H(X, Y) = 0$ then X and y are independent.

53. Which of the following sets of codewords could be the Huffman code for some 4 symbol source alphabet?
(a) 01, 10, 00, 111 (b) 0, 10, 110, 111 (c) 1, 01, 10, 001 (d) 0, 110, 111, 101

54. In one line of image, three consecutive pixel values are 22, 24 and 36. The next pixel value is predicted by a linear prediction that is based on the last 2 pixels with the coefficient of 0.6 for the last and 0.2 for the second last. The predicted pixel with integer approximation is
(a) 22 (b) 24 (c) 26 (d) 30

55. An image uses 512 × 512 picture elements. Each of the picture elements can take any of the 8 distinguishable intensity levels. The maximum entropy in the above image will be
(a) 2097152 bits (b) 648 bits (c) 786432 bits (d) 144 bits

56. In Cyrus Beck Line clipping algorithm if N is the outward normal and P_E is a point on an window edge. Then what is the condition that a point is inside the window edge if we consider a line from a point P to Q.

(a) $N.(P + t(Q-P) - P_E) < 0$ (b) $N.(P + t(Q-P) - P_E) > 0$

(c) $N.(P + t(Q-P) - P_E) = 0$ (d) $N.(P + t(Q-P) - P_E) != 0$

57. Consider a window defined by the (X_{min}, Y_{min}) and (X_{max}, Y_{max}) as Lower left corner and upper right corner. In Liyang Barsky Line clipping Algorithm if we consider the line from $P(x1, y1)$ to $Q(x2, y2)$ the n which of the following is true?

(a) $X_{min} \le x1 + t(x2-x1) \le X_{max}, Y_{min} \le y1 + t(y2-y1) \le Y_{max}$ where $t\varepsilon[0, 1]$

(b) $X_{max} \le x1 + t(x2-x1) \le X_{min}, Y_{max} \le y1 + t(y2-y1) \le Y_{min}$ where $t\varepsilon[0, 1]$

(c) $X_{min} \ge x1 + t(x2-x1) \ge X_{max}, Y_{min} \ge y1 + t(y2-y1) \ge Y_{max}$ where $t\varepsilon[0, 1]$

(d) $X_{min} \ge x1 + t(x2-x1) \le X_{max}, Y_{min} \le y1 + t(y2-y1) \ge Y_{max}$ where $t\varepsilon[0, 1]$

58. Consider a window and view port with following coordinate

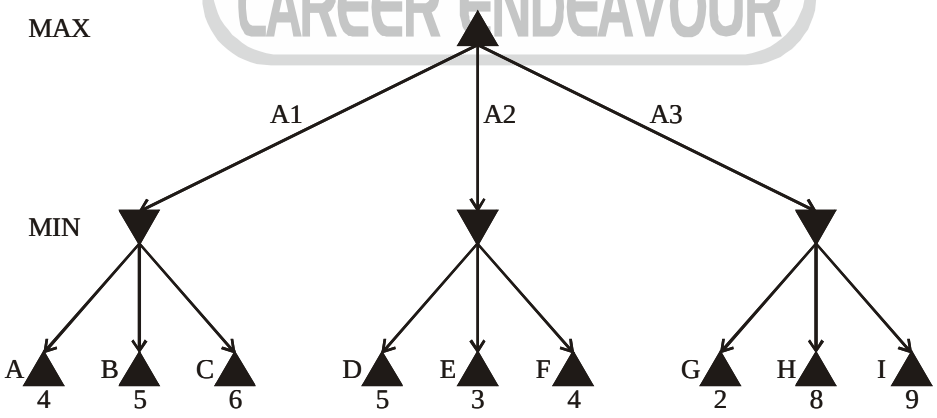
	Lower Left Corner	Upper Right Corner
Window	$(X_{w\,min}, Y_{w\,min})$	$(X_{w\,max}, Y_{w\,max})$
View Port	$(X_{v\,min}, Y_{v\,min})$	$(X_{v\,max}, Y_{v\,max})$

If we want to perform the window to view port transformation then what is the scaling factors?

(a) $S_x = \frac{(X_{w\,max} - Y_{w\,max})}{(X_{v\,max} - Y_{v\,max})}, S_y = \frac{(Y_{w\,max} - X_{w\,max})}{(Y_{v\,max} - X_{v\,max})}$ (b) $S_x = \frac{(X_{w\,max} - Y_{w\,max})}{(X_{v\,max} - Y_{v\,max})}, S_y = \frac{(Y_{w\,max} - X_{w\,max})}{(X_{v\,max} - X_{v\,min})}$

(c) $S_x = \frac{(Y_{w\,max} - Y_{w\,min})}{(X_{v\,max} - Y_{v\,max})}, S_y = \frac{(Y_{w\,max} - Y_{w\,max})}{(Y_{v\,max} - X_{v\,max})}$ (d) $S_x = \frac{(X_{w\,max} - X_{w\,min})}{(X_{v\,max} - X_{v\,min})}, S_y = \frac{(Y_{w\,max} - Y_{w\,min})}{(Y_{v\,max} - Y_{v\,min})}$

59. Let us consider the following game tree for two player



Assume one applies alpha-beta pruning. Which of the following collection of nodes will all not being explored?

(a) $\{A, D, G\}$ (b) $\{G, H, I\}$ (c) $\{C, F, I\}$ (d) $\{F, H, I\}$

60. Which of the following perform the list concatenation operation of two list in prolog

(a) $\text{conc}([\,], L, L).$

$\text{conc}([X \mid L1], L2, [X \mid L3]) :- \text{conc}(L1, L2, L3).$

(b) $\text{conc}([\,], L, L).$

$\text{conc}([X \mid L1], L2, [X \mid L3]) :- \text{conc}(X, L2, L3).$

(c) $\text{conc}([\,], L, L).$

$\text{conc}([X \mid L1], L2, L3) :- \text{conc}(L1, L2, L3).$

(d) $\text{conc}([\,], L, L).$

$\text{conc}(L1, L2, [X \mid L3]) :- \text{conc}(L1, L2, L3).$

61. Consider the following knowledge base in Prolog

$a(X) :- b(x), !, c(X).$

$b(1).$

$b(2).$

$b(3).$

$c(2).$

What is the output if
?-a(Q) is fired ?

(a) Q = 2 (b) Q = 1, Q = 2 (c) Q = 1, Q = 2, Q = 3 (d) Q = 1, Q = 3

62. Negation of a goal in prolog is implemented as

(a) not (Goal):- call (Goal), !, fail.
not (Goal).

(b) not (Goal) :- call (Goal), Fail.
not (Goal).

(c) not (Goal):- call (Goal), fail, !.
not (Goal).

(d) none of these

63. What is the command to make a file readable, writable and executable to the owner, readable and executable to group and other is

(a) chmod 000 (b) chmod 755 (c) chmod 744 (d) chmod 555

64. Match the following

P. SMTP	1. Application layer
Q. BGP	2. Transport layer
R. TCP	3. Data link layer
S. PPP	4. Network layer
	5. physical layer

(a) P – 2, Q – 1, R – 3, S – 5 (b) P – 1, Q – 4, R – 2, S – 3

(b) P – 1, Q – 4, R – 2, S – 5 (d) P – 2, Q – 4, R – 1, S – 3

65. The (15, 4) maximal length code is dual code of (15, 11) hamming code. The generator polynomial of (15, 11) hamming code is given as $(1 + x + x^4)$. Then what is the generator polynomial of (15, 4) maximum lengthcode.

(a) $1 + x + x^4$ (b) $x^{11} + x^8$

(c) $x^{11} + x^8 + x^7 + x^5 + x^3 + x^2 + 1$ (d) $x^{11} + x^8 + x^5 + x^2 + x + 1$

66. Using relational algebra the query that finds customers, who have a balance of over 1000 is

(a) $\Pi_{customer\_name}\left(\sigma_{balance>1000}\left(Deposite\right)\right)$ (b) $\sigma_{customer\_name}\left(\Pi_{balance>1000}\left(Deposite\right)\right)$

(c) $\Pi_{customer\_name}\left(\sigma_{balance>1000}\left(Borrow\right)\right)$ (d) $\sigma_{customer\_name}\left(\Pi_{balance>1000}\left(Borrow\right)\right)$

67. A unix file system has 1 kB block size and 4-bytes disk address. What is the maximum file size if the inode contain

• 10 direct block entries
• one single indirect block entry
• one double indirect block entry
• one triple indirect block entry

(a) 30 GB (b) 64 GB (c) 16 GB (d) 1 GB

68. A relation $R\left(ABCDE\right)$ with

$F = \left\langle A \to BC, C \to D, D \to B, B \to E, A \to E \right\rangle$

The decomposition of $R : R_1\left(ABC\right), R_2\left(CD\right), R_3\left(BDE\right)$ is

(a) Lossless and dependency preserving (b) Lossless but not dependency preserving
(c) Not lossless but dependency preserving (d) Neither lossless nor dependency preserving

69. If D1, D2 ….. Dn are domains in relational model then the relation is a table which is a subset of —

(a) { D1, D2 ….. Dn} (b) D1 x D2 x …. Dn
(c) D1 U D2 U …..Dn (d) Maximum { D1, D2 ….. Dn}

70. How many characters per second (7 bits + 1 parity) can be transmitted over a 2400 bps line if the transfer is synchronous (1 start and 1 stop bit)?

(a) 300 (b) 240 (c) 250 (d) 275

71. The physical location of a record is determined by a mathematical formula that transforms a file key into a record location is :

(a) B-Tree File (b) Hashed File (c) Indexed File (d) Sequential file.

72. Consider a database table T containing two columns x and y each type integer. After creation of the table, one record (X = 1) is inserted in the table. Let Mx and My denote the respective maximum value of x and y among all records in the table at any point in time. Using mx+1, 2×my+1 respectively. It may be noted that each time after insertion values of Mx and My change.

What will be the input of the following SQL query after the steps mention above are carried out?

select y from T where x = 7

(a) 127 (b) 255 (c) 129 (d) 257

73. Consider the table employee (emp_id, name, department, salary) and the two queries Q_1, Q_2 below. Assuming that department 5 has more than one employee, and we want to find the employees who get higher salary than anyone in the department 5, which one of the statements is TRUE for any arbitrary employee table?

Q_1 : Select e.empId From employee e where not exists
(select * From employee e where s.department = “5” and s.salary = e.salary)

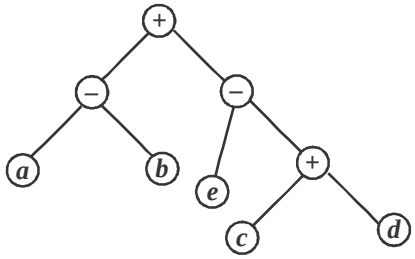
Q_2 : Select e.empid
From employee e where e.salary > Any
(select distinct salary From employee s where s.department = “5”)

(a) Q_1 is the correct query
(b) Q_2 is the correct query
(c) Both Q_1 and Q_2 produce the same answer
(d) Neither Q_1 nor Q_2 is the correct query

74. Let f be the fraction of a computation (in terms of time) that is parallelizable, P the number of processors in the system and sp the speed up achierable in comparison with sequential execution, then the sp can be calculated using the relation

(a) $\frac{1}{1-f-f/P}$ (b) $\frac{P}{P-f(P+1)}$ (c) $\frac{1}{1-f+f/P}$ (d) $\frac{P}{P+f(P-1)}$

75. Consider evaluating the following expression tree on a machine with load-store architecture in which memory can be accessed only through load and store instructions. The variables a, b, c, d and e initially stored in memory. The binary operators used in this expression tree can be evaluate by the machine only when the operands are in registers. The instructions produce results only in a register. If no intermediate results can be stored in memory, what is the minimum number of registers needed to evaluate this expression?



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

COMPUTER SCIENCE & APPLICATIONS
TEST SERIES-E
PART-I

Date : 15-01-2017

1. (d)	2. (a)	3. (c)	4. (d)	5. (a)	6. (d)	7. (a)
8. (c)	9. (d)	10. (d)	11. (d)	12. (b)	13. (d)	14. (b)
15. (b)	16. (a)	17. (d)	18. (d)	19. (a)	20. (b)	21. (a)
22. (a)	23. (d)	24. (d)	25. (b)	26. (a)	27. (c)	28. (a)
29. (c)	30. (d)	31. (b)	32. (a)	33. (c)	34. (b)	35. (a)
36. (c)	37. (d)	38. (c)	39. (c)	40. (c)	41. (a)	42. (b)
43. (c)	44. (b)	45. (b)	46. (b)	47. (b)	48. (c)	49. (a)
50. (d)	51. (c)	52. (b)	53. (b)	54. (a)	55. (c)	56. (b)
57. (a)	58. (d)	59. (c)	60. (c)			

PART-II

1. (b)	2. (d)	3. (a)	4. (d)	5. (b)	6. (d)	7. (a)
8. (a)	9. (b)	10. (b)	11. (d)	12. (d)	13. (a)	14. (c)
15. (b)	16. (b)	17. (b)	18. (c)	19. (a)	20. (d)	21. (c)
22. (b)	23. (b)	24. (b)	25. (c)	26. (b)	27. (c)	28. (b)
29. (c)	30. (d)	31. (b)	32. (d)	33. (c)	34. (b)	35. (d)
36. (c)	37. (d)	38. (c)	39. (d)	40. (b)	41. (d)	42. (d)
43. (b)	44. (b)	45. (c)	46. (c)	47. (b)	48. (b)	49. (d)
50. (d)						

PART-III

1. (b)	2. (d)	3. (c)	4. (a)	5. (a)	6. (c)	7. (d)
8. (c)	9. (c)	10. (c)	11. (d)	12. (c)	13. (d)	14. (c)
15. (d)	16. (d)	17. (b)	18. (a)	19. (a)	20. (b)	21. (c)
22. (b)	23. (b)	24. (a)	25. (c)	26. (b)	27. (a)	28. (c)
29. (d)	30. (d)	31. (a)	32. (c)	33. (c)	34. (c)	35. (a)
36. (a)	37. (a)	38. (a)	39. (d)	40. (d)	41. (d)	42. (d)
43. (b)	44. (c)	45. (b)	46. (b)	47. (d)	48. (d)	49. (c)
50. (a)	51. (a)	52. (c)	53. (b)	54. (c)	55. (c)	56. (a)
57. (a)	58. (d)	59. (c)	60. (a)	61. (a)	62. (a)	63. (b)
64. (b)	65. (c)	66. (a)	67. (a)	68. (b)	69. (b)	70. (b)
71. (b)	72. (a)	73. (b)	74. (b)	75. (c)		