S-55

Entrance Examination (June 2018)

Ph.D. in Computer Science

Time: 2 Hours **Max Marks: 80**

Hall Ticket Number:

INSTRUCTIONS

1. Write your Hall Ticket Number in the above box **and** on the OMR Sheet.
2. This test is for **2 hours duration** carrying **80 marks**.
3. This test is objective type and has two parts: Part A contains 40 questions on Research Methodology, whereas Part B contains 40 questions on Computer Science. Please make sure that all the questions are clearly printed in your paper.
4. Every correct answer gets **1 (one) mark**. **There is negative marking of 0.33 marks for every wrong answer**.
5. All answers should be marked clearly in the OMR answer sheet only.
6. Do not use any other paper, envelope etc. for writing or doing rough work. All the rough work should be done in your question paper or on the sheets provided with the question paper at the end.
7. During the examination, anyone found indulging in copying or having any discussions will be asked to leave the examination hall.
8. Use of non-programmable calculator and log-table are allowed.
9. Use of mobile phone is **strictly prohibited** inside the hall.
10. Submit the OMR sheet to the invigilator before leaving the examination hall.

Part A: Research Methodology

1. Random sampling is helpful as it is

   A. Reasonably accurate

   B. Free from personal biases

   C. An economical method of data collection

   D. All the above

2. Type-I Error occurs if

   A. The null hypothesis is rejected even though it is true

   B. The null hypothesis is accepted even though it is false

   C. Both the null hypothesis as well as alternative hypothesis are rejected

   D. None of the above

3. The F-test:

   A. is essentially a two tailed test

   B. is essentially a one tailed test

   C. can be one tailed as well as two tailed depending on the hypothesis

   D. can never be a one tailed test

4. When two or more successive footnotes refer to the same work which one of the following expressions is used

   A. et al.

   B. op. cit

   C. loc. cit

   D. ibid

5. Suppose a random sample of 100 objects was considered and their widths were measured. The mean width of the sample was 64 inches and the standard deviation of the sample was 5 inches. Assume that the widths of the objects are normally distributed. Which interval below includes approximately 95% of the widths of the objects?

   A. 63 to 65 inches

   B. 59 to 69 inches

   C. 54 to 74 inches

   D. Cannot be determined from the information given

6. A random sample of 1000 measurements was taken. Assume that the 99% confidence interval for the population mean was 68 to 73 (in arbitrary units). Now, if a 95% confidence interval is to be calculated, then

   A. The 95% confidence interval will be wider than the 99%

   B. The 95% confidence interval will be narrower than the 99%

   C. 95% and 99% confidence interval will be the same

   D. One cannot make a general statement about whether the 95% confidence interval would be narrower, wider or the same as the 99%

7. Having two sets of data, we wish to compare their scattering. Which of the following statement/s is/are TRUE: I. For approximately equal average values, the one with a higher standard deviation is more scattered II. For approximately equal standard deviation values, the one with a higher average is more scattered III. For approximately equal standard deviation values, the one with a lower average is more scattered

   A. I only

   B. II only

   C. Both I and II

   D. Both I and III

8. The result of a statistical test, denoted p, shall be interpreted as follows:

   A. the null hypothesis H0 is rejected if $p < 0.05$

   B. the null hypothesis H0 is rejected if $p > 0.05$

   C. the alternate hypothesis H1 is rejected if $p > 0.05$

   D. the null hypothesis H0 is accepted if $p < 0.05$

9. The Confidence Interval for the mean, calculated for a series of values, has the interpretation:

   A. The true mean, the one that approximates the populations mean, is almost certainly inside the confidence interval

   B. The true variance is almost certainly inside the confidence interval

   C. The true median is almost certainly inside the confidence interval

   D. None of the Above

10. When searching for the best fit line for data using linear regression, which of the following approaches are commonly used?

    A. Logarithmic Loss

    B. ANOVA

    C. Parametric Estimation

    D. Least Square Error

11. The probability of getting Five Mondays in a 31 day Month is:

    A. 1/7

    B. 2/7

    C. 3/7

    D. None of these

12. A married couple has two children. One of the children is a girl. Given that having either girl or boy is equiprobable then the probability that the other child is also girl is:

    A. 1/3

    B. 1/4

    C. 1/8

    D. None of these

13. How many 0's are at the end of 20! when represented in decimal?

    A. 4

    B. 5

    C. 6

    D. 7

14. A mineral collection contains 12 samples of Calomel, 7 samples of Magnesite, and N samples of Siderite. Suppose choosing at least 15 samples from the collection guarantees that you have 3 samples of the same type of mineral. What is N?

    A. 6

    B. 2

    C. 3

    D. 4

15. You are told that $n = 110179$ is the product of two primes p and q. The number of positive integers less than n that are relatively prime to n (i.e. those m such that $\gcd(m, n) = 1$) is 109480. What is the value of $p + q$.

    A. 700

    B. 750

    C. 600

    D. 650

16. The format for car number plates in a country is two digits followed by three vowels, e.g. 04 IOU. A license plate is called "confusing" if the digit 0 (zero) and the vowel O are both present on it. For example 04 IOU is confusing but 20 AEI is not. How many distinct number plates are possible that are not confusing?

A. 12500

B. 6400

C. 11341

D. None of these

17. If the letters of the word "PROTECTION" which are at odd numbered position in English alphabet are picked up and are arranged in alphabetical order from left. If they are now substituted by Z, Y, X and so on beginning from left, which letter gets substituted by X?

A. E

B. O

C. T

D. I

18. Shankar ranks 7^{th} from the top in a class of 35 students. What is the rank of Gopal from bottom who is four ranks below Shankar from top?

A. 25

B. 26

C. 27

D. 28

Questions 19 and 20 are based on the following information: P and Q are brothers of R. Q is son of S and T. S is daughter of U. A is father-in-law of T. B is son of U.

19. What is the relation of P to B?

A. Nephew

B. Paternal uncle

C. Neice

D. Paternal aunt

20. What is relation of P to A?

A. Grandson

B. Son

C. Daughter

D. Father

21. Let there be N independent variables $x_1, x_2, x_3, \ldots, x_N$ and a dependent variable y. Suppose we are applying linear regression by fitting the best fit line using least square error on this data. We find that the coefficient of correlation between y and one of the variables x_3 is -0.95. Which of the following is true for x_3?

A. Relation between x_3 and y is weak

B. Relation between x_3 and y is strong

C. Relation between x_3 and y is neutral

D. It is not possible to judge the relationship

22. In one year, three awards (research, teaching and service) will be given to a class of 25 graduate students in a Statistics Department. If each student can receive at most one award, how many possible selections are there?

A. 18,800

B. 13,800

C. 12,800

D. 14,800

23. Suppose we are given two variables v_1 and v_2. It is observed from the data that

I. If v_1 increases then v_2 also increases

II. If v_1 decreases then v_2's behaviour is unknown

Which of the following is appropriate for the statistical relationship between v_1 and v_2

A. Pearson correlation coefficient will be close to 1

B. Pearson correlation coefficient will be close to -1

C. The data has zero mean and unit variance

D. None of the above

The distribution of students at Harvard University for the professional courses is given in Table 1. Answer questions 24–28 based on the data provided in this table.

Course	Faculty			
	Engineering		Non-Engineering	
	Girls	Boys	Girls	Boys
Business Management	25	45	25	65
Computers	23	186	20	32
Finance	25	120	12	58
Others	12	100	3	5

Table 1: The distribution of students at Harvard University

24. If 60% of boys and 70% of girls are successful in the courses taken by them, then what is the approximate combined pass percentage?

A. 67.2
B. 64.1
C. 62
D. 68.5

25. Which course has the highest percentage of girls with respect to total number of students enrolled in that course?

A. Business Management
B. Finance
C. Computers
D. Others

26. The percentage of girl engineers doing Business Management is approximately

A. 15%
B. 40%
C. 30%
D. 25%

27. By what percentage is the number of students doing Computers more than the number of students doing Business Management?

A. 67.2
B. 63.1
C. 62
D. 68.5

28. Taking all courses together, by what percentage does the number of boys exceed the number of girls?

A. 321.4%
B. 231.4%
C. 321.4%
D. 421.4%

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Read the following passage and answer questions 29–33:

We are always being urged to stay safe online. But in an era where the internet is part of our everyday lives - for work, fun, study, shopping, even managing finances - it's not always easy to spot the dangers. Web safety expert, Amanda Knox, explores some of the issues lurking in cyberspace.

Her first piece of advice is to install software and a firewall to protect your computer from viruses, hackers and criminals who want to steal your data or financial information. "Think of these as your first line of defence," says Amanda. So much for protecting yourself against intruders, but what about other problems? Suppose you've accidentally deleted an important file or you've been at the mercy of a natural disaster. Katy Marsh runs an online photography business from home and when a fire destroyed part of her house it could easily have spelled ruin for her business too. "Luckily I keep a regular back-up of my data so it wasn't a catastrophe." Amanda advises that while back-ups are good to have we must ensure we protect our computers to start with.

Whilst most of us are aware of the need to protect our computers, it seems we're more lax when it comes to looking out for ourselves, at least according to a recent web awareness survey. Web safety specialists say better personal awareness is needed and this is due in part to the rise of 'Social Networking' sites like 'Facebook' or 'Twitter', which allow us to connect with people around the world with similar interests and professional backgrounds. Chris Simpson, a computer programmer, learnt the hard way. "I joined a free online networking group in the hope of making some professional contacts to help me find a new job. After a month, one of my online contacts invited me to take out a subscription to a club that promised access to a network of job recruiters. It turned out to be a waste of money. I ended up a laughing stock with my mates - they couldn't believe that someone in my job could get taken in so easily." No wonder then that Amanda warns, "It's easy to get complacent and let our guard down when we meet someone with the same interests online."

This brings us to other potential pitfalls. Are the people you meet online who they really claim to be? Can you be sure the person you're chatting with is in fact a 22-year-old Maths undergraduate from London and not someone merely masquerading as a student to win your trust?

When networking and joining online communities it's better to be cautious about the amount of personal information you share. For example, it isn't always necessary to use your real name as a username when registering for a service. You could instead use a pseudonym, or a name that doesn't give away your real identity to other users. And is it really important to tell the world details about your school, college or any local clubs you're a member of? Sometimes it pays to be a little vague and simply say something like 'I'm studying at college in Madrid at the moment and I'm a member of a local tennis club'.

If you do experience problems from another user, be prepared to report them for misusing the service. You'll be doing other users a favour too. And if all else fails, check to see if it is easy to delete your account and leave the service if you choose to and that you have the option to delete all your details. A general rule of thumb is not to post any information about yourself that you would not be happy for the

world to know - not just now but in years to come. It's not always easy to remove information after it's been posted so you - not to mention your future employer - may have an unpleasant surprise a few years down the line.

29. In the second paragraph the phrase 'first line of defence' refers to

A. taking regular backup
B. use protections.
C. disconnecting the internet.
D. showing weakness.

30. The effect of the fire was

A. worse for Katy's business than her home.
B. to ruin Katy's business.
C. not as serious for Katy's business as it could have b
D. to make Katy start to back up her data.

31. According to the web awareness survey, our attitude to o r personal safety is rather

A. relaxed.
B. concerned.
C. positive.
D. uncertain.

32. What tip does the writer give for joining an online community?

A. always use a false nam
B. make sure yo a pr perly registered.
C. limit the inf mat n you give to others.
D. tell oth rs where you're studying.

33. In the nal paragraph, the writer advises people

A. n o put photos online.
B. apply for a job online.
C. to post personal information online.
D. to ponder before making personal information public.

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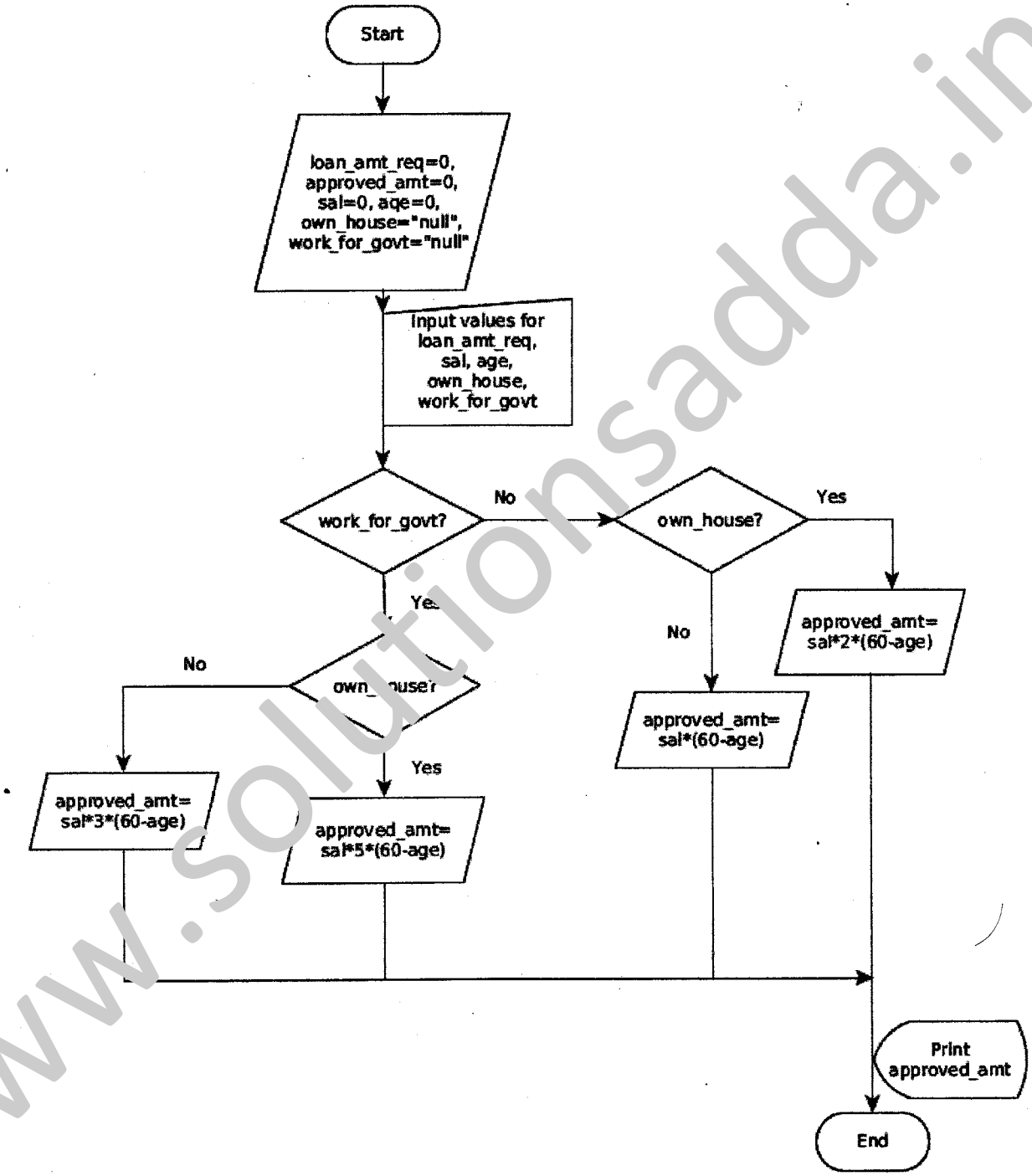


Figure 1: Flowchart for questions 34 and 35

Questions 34 and 35 are based on the flowchart given in Figure 1

34. For an individual who works for a government organization and owns a house, it is given that he is 35 years old and earns Rs. 15,000 per month. What would be the *approved_amt* (in Rs.) for him?

A. 15,00,000

B. 18,75,000

C. 16,00,000

D. 20,50,000

35. A person wishes to avail a loan of Rs. 50,00,000. He works for a government organization and does not own a house. Would he get the loan if he draws a salary of Rs. 60,000 and his age is 28 years? If he does get a loan, what amount would he be entitled? If not, by what amount he would be short of the required amount?

A. Yes, he would get a loan equal to Rs. 57,60,000.

B. Yes, he would get a loan exactly equal to Rs. 50,00,000.

C. No, he would not get a loan. He would be short of Rs. 7,00,000.

D. No, he would not get a loan. He would be short of Rs. 7,60,000.

In the following two questions (36 - 37), first a statement is presented followed by two conclusions numbered I and II. If the statement is considered true, you may work out whether the conclusions follow logically from the information given in the statement.

36. **Statement:** The old order changed yielding place to new. **Conclusion I:** Change is law of nature. **Conclusion II:** Discard old ideas because they are old. Which of the following is true

A. Only conclusion I follows

B. Only conclusion II follows

C. Both I and II follow

D. None of the above

37. **Statement:** Government has spoiled many top ranking financial institutions appointing bureaucrats as directors of these institutions. **Conclusion I:** Government should appoint directors of the financial institutes taking into consideration the expertise of the person in the area of finance. **Conclusion II:** The director of the financial institute should have expertise commensurate with the financial work carried-out by the institute. Which of the following is true

A. Neither I nor II follows

B. Only conclusion I follows

C. Only conclusion II follows

D. Both I and II follow

38. Hundred students answered a question paper that was set for 50 marks. The maximum mark obtained was 45 and the average of the marks was say a and standard deviation of this distribution was σ. Then it was decided to add 5 marks to all the students and the total marks of the paper was scaled to 100. If a_{new} is the new average and σ_{new} is the standard deviation of the modified distribution, then which of the following is true.

A. $a_{new} = a + 5, \sigma_{new} = \sigma$

B. $a_{new} = 2(a + 5), \sigma_{new} = \sigma$

C. $a_{new} = 2(a + 5), \sigma_{new} = 2\sigma$

D. $a_{new} = a, \sigma_{new} = \sigma$

39. Give the negation of the following statement:
For some n, for every word w in the dictionary L, w has at least n meanings.

A. For some n, there is a word w in the dictionary L, w has at least n meanings.

B. For some n, there is at least one word w in the dictionary L, w has at most n meanings.

C. Given any n, all the words w in the dictionary L have at most n meanings.

D. Given any n, there is at least one word w in the dictionary L that has at most n meanings.

40. Suppose time for execution taken by algorithms A and B are written as t(A) and t(B) respectively. If the algorithm A performs exponentially faster than an algorithm B then,

A. The time taken by A is greater than the time taken by B

B. Time taken by A is $\exp(t(B))$

C. Time taken by A is $\log(t(B))$

D. None of the above

Part B: Computer Science

41. A machine uses a 16-bit two's complement representation for integers, and little-endian byte-ordering, this means that the least significant byte of an integer is stored at the lower address. What is the output for the following program fragment?

```
int x; /* 16 bit signed integer */
char *p = (char *) & x;
x = 0x0013;
printf("x=%d \n",x);
printf("%d %d\n", p[0],p[1]);
```

A. x=9
19 0

B. x=19
9 0

C. x=9
9 0

D. None of the above

42. A 64kb direct mapped cache has 16 byte blocks. If the address is of 32 bit, how many bits are used for tag, index and offset in this cache?

A. 16,13,4

B. 12,16,4

C. 16,12,4

D. 16,14,4

43. A non-pipeline system takes 40ns to process a task. The same task can be processed in a 6-segment pipeline with a clock cycle of 10s. Determine the speed up ratio of the pipleline for 100 tasks.

A. 4.8

B. 4.1

C. 4.16

D. 4.92

44. Consider an instruction pipeline with five stages without any branch prediction. Fetch Instruction(FI), Decode Instruction(DI), Fetch Operand(FO), Execute Instruction(EI) and Write Operand(WO). The stage delays for FI, DI, FO, EI and WO are 5 ns, 7 ns, 10 ns, 8 ns and 6 ns, respectively. There are intermediate storage buffers after each stage and the delay of each buffer is 1 ns. A program consisting of 12 instructions $I_1, I_2, I_3, \ldots, I_{12}$ is executed in this instruction pipeline, the time (in ns) needed to complete the program is

A. 132

B. 165

C. 176

D. 32

45. While implementing a priority queue, minimum number of queues required is?

A. one

B. two

C. three

D. four

46. A binary search tree where the difference between the heights of the left subtree and the right subtree can never be more than one is known as

A. Red-Black tree

B. Lemma tree

C. AVL Tree

D. Spanning Tree

47. What is the value of the variable `var` after executing the following lines of C code assuming variables of type `int` are represented using 4 bytes .

```
int var = 1;
while(var >= 1)
{
var = var + 1;
}
```

A. $-2^{31} - 1$

B. -2^{31}

C. Program goes to infinite loop

D. $2^{31} - 1$

48. Which of the following is the correct order of operator evaluation for the expression: i + 5 || x < ! i && z

A. +, ||, <, !, &&

B. !, + , <, ||, &&

C. !, +, <, &&, ||

D. !, +, ||, <, &&

49. An unsorted array containing n elements has the property that every element in the array is at most k distance from its position in the sorted array, where k is a positive integer smaller than n. What is the best time complexity to sort this array?

A. $\mathcal{O}(nk)$

B. $\mathcal{O}(n \log k)$

C. $\mathcal{O}(n^2)$

D. $\mathcal{O}(n \log \log k)$

50. What is the solution of the recurrence $T(n) = T(n/4) + T(n/2) + cn^2$

A. $\mathcal{O}(n^3)$

B. $\mathcal{O}(n^2)$

C. $\mathcal{O}(n^2 \log n)$

D. $\mathcal{O}(n^3 \log n)$

51. The number of paths of length 3 between two different vertices in K_4 is

A. 7

B. 6

C. 9

D. 8

52. A word that does NOT get accepted by the Regular Expression $(01^* + 10)^*$ is

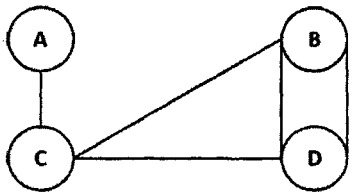
A. 0

B. 11

C. 100

D. 1001

53. The adjacency matrix of the following graph is:



A.

	A	B	C	D
A	0	0	1	0
B	0	0	1	2
C	1	1	0	1
D	0	2	1	0

B.

	A	B	C	D
A	0	0	1	0
B	0	0	1	1
C	1	1	0	1
D	0	1	1	0

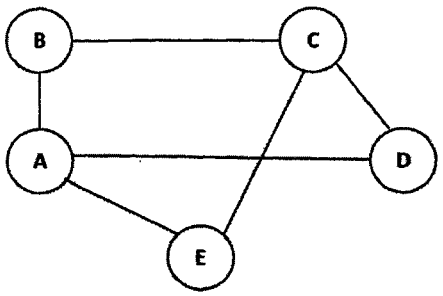
C

	A	B	C	D
A	1	0	1	0
B	0	1	1	1
C	1	1	0	1
D	0	1	1	1

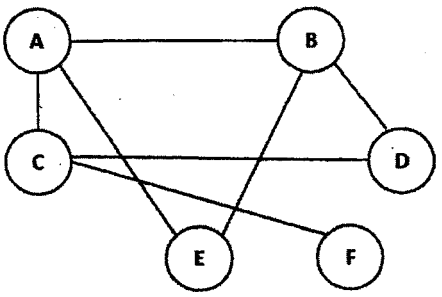
D. All of the above

54. What is true for the following graphs

(i)



(ii)



A. Both the graphs are bipartite

B. (i) is bipartite but (ii) is not

C. (i) is not bipartite but (ii) is bipartite

D. Both are not bipartite

55. How many edges does a graph have if it has vertices of degree 4, 3, 3, 2, 2?

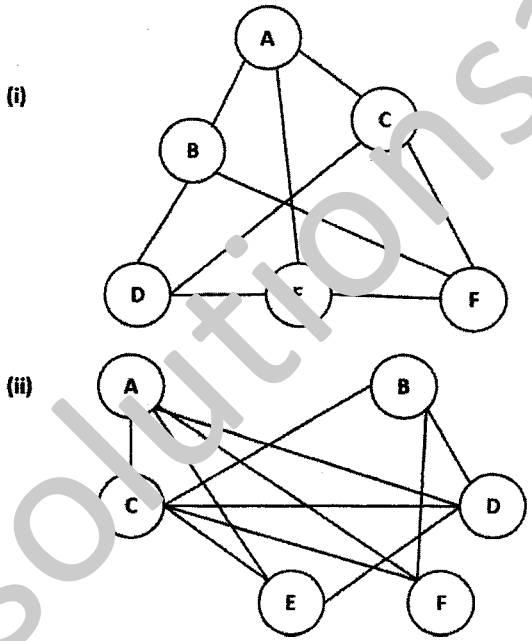
A. No such graph exist

B. Graph has 4 edges

C. Graph has 14 edges

D. Graph has 7 edges

56. What is true about the following two graphs



A. (i) is planar but (ii) is not

B. Both are planar

C. (ii) is planar but (i) is not

D. Both are not planar

57. Number of states required by a minimal Deterministic Finite Automata (DFA) that recognizes the language a^*b is

A. 2

B. 3

C. 4

D. 1

58. What is the language of the following grammar
$$S \rightarrow 0S1 \mid 1S0 \mid \epsilon$$

A. $\{ w : w$ has equal number of 0's and 1's $\}$

B. $\{0^n1^n \cup 1^n0^n : n \geq 0\}$

C. Words having equal number of 0's and 1's whose start and end symbols are not the same

D. Words having equal number of 0's and 1's whose start and end symbols are the same

59. Indicate a set of words that does NOT get generated by the following grammar
$$S \rightarrow aSb \mid bY \mid Ya$$
$$Y \rightarrow bY \mid aY \mid \epsilon$$

A. $\{a^nb^n : n \geq 1\}$

B. $\{a^nb^{n-1} : n \geq 1\}$

C. $\{a^{n+1}b^n : n \geq 1\}$

D. $\{a^nbab^n : n \geq 1\}$

60. The problem of finding if two regular languages have at least one string in common is

A. decidable

B. Recursively enumerable (RE), but not recursive

C. non-RE

D. None of the above

61. Let $L = \{a^nb^n \mid 0 \leq n \leq 100\}$. Then L is

A. Context free, but not regular

B. Recursive, but not context free

C. Recursively enumerable, but not recursive

D. Regular

62. What is the time complexity to find a simple cycle in a graph of n vertices?

A. $\mathcal{O}(n^2)$

B. $\mathcal{O}(n)$

C. $\mathcal{O}(n \log n)$

D. $\mathcal{O}(n^n)$

63. What is the output of the function fun when head points to the first node of the following linked list?
$2 \rightarrow 4 \rightarrow 6 \rightarrow 8 \rightarrow 2 \rightarrow 4$

```
void fun(struct node* head)
{
if(head == NULL)
   return;
printf("%d ", head->data);

if(head->next != NULL )
fun(head->next->next);
printf("%d ", head->data);
}
```

A. 284482
B. 268
C. 262262
D. None of the above

64. Which of the following scheduling algorithms do NOT lead to starvation:

I. FCFS
II. SJF
III. Round Robin
IV. Priority Scheduling

A. I, II, III
B. I, III
C. I, II
D. I, III, IV

65. Which of following binding schemes has loss of efficiency if there is no TLB in the system ?

A. Compile-time binding
B. Load-time binding
C. Run-time binding
D. None of the above

66. A file system has 32 disk blocks overall. It maintains its free disk blocks as a bit vector. Currently, the bit vector is 00001100 11111100 00000000 00110000. When a file is created with a certain number of blocks the free blocks are always allocated from the least numbered block (the leftmost bit in the bit vector). The file system uses non-contiguous file allocation scheme. When a file with a requirement of 10 blocks is created the new bit vector will be:

A. 00001100 11111100 11111111 11110000
B. 00111111 11111111 11111111 11111111
C. 11111111 11111111 11111111 11111100
D. None of the above

67. The number of page table entries for a 64-bit processor with 16KB page size is,

A. 2^{50}
B. 2^{51}
C. 2^{18}
D. 2^{64}

68. In which of the following Multithreading techniques will the process be blocked if one of the threads blocks?

A. One-to-one Multithreading
B. Many-to-one Multithreading
C. Many-to-many Multithreading
D. None of the above

69. Which of the following conditions leads to thrashing? (WSS is Working Set Size)

A. All processes are allocated more memory than their WSS
B. The sum of the WSS of the processes is less than the main memory
C. One of the processes is allocated more memory than its WSS
D. The sum of the WSS of the processes is more than the main memory

70. TTL field in IP header is used for the following purpose:

A. To determine if the network is congested
B. To drop a packet that may be in a routing loop
C. To detect errors in the IP packet during transmission
D. To slow down traffic from a fast sender

71. If a class B network is subnetted such that there are at least 20 subnets, what is the minimum number of bits that need to be used for the subnet mask?

A. 4
B. 8
C. 3
D. 5

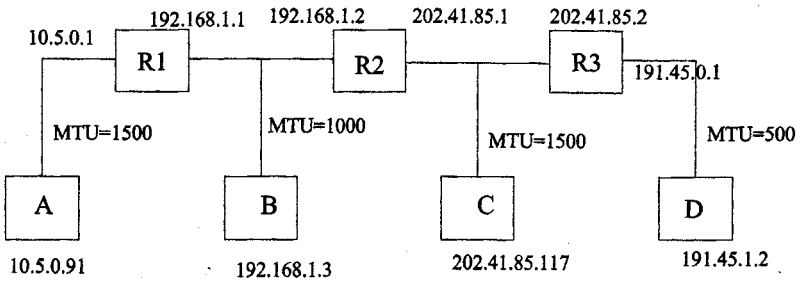


Figure 2: A Network Topology for Questions 72–73

Questions 72–73 are based on following information: In the network topology shown in Figure 2, assume that every host (i.e., A, B, C and D) have default router as the router to its right if it has more than one router connected to it, i.e., for B and C, it is R_2 and R_3 respectively. Otherwise, the default router is the router connected to it. Also, assume that all the networks shown in the figure have default network masks as per their class and that all routers have entries for all the networks shown in the figure. The routers do NOT have default routes nor for any networks not shown in the figure. The MTUs of the links are shown on each of the links.

72. When 10.5.0.91 pings 202.41.85.116, which of the following ICMP messages is sent?

A. ICMP Network Unreachable Message

B. ICMP Host Unreachable Message

C. ICMP Time Exceeded

D. ICMP Redirect

73. When 10.5.0.91 pings 202.41.85.117 with TTL=2, which of the following ICMP messages is received in reply?

A. ICMP Destination Unreachable

B. ICMP Time Exceeded

C. ICMP Echo Reply

D. ICMP Host Unreachable

74. If a TCP client sends segments with sizes 100B, 200B, 500B, 150B and 20B, all with PSH bit set, which of the following is NOT a possible sequence of TCP acknowledgements received?

A. 101, 201, 501, 151, 21

B. 101, 101, 801, 951, 971

C. 101, 301, 801, 801, 971

D. 101, 101, 101, 951, 971

75. DHCP protocol is NOT used for which of the following?

A. Assign IP address

B. Discover the default router

C. Discover the DNS server

D. Discover the path to the destination

76. The maximum number of superkeys for the relation schema R(E,F,G,H) with E as the key is

A. 8

B. 7

C. 6

D. 5

77. Suppose there are three relations as given below:

(a) R(a,b)= (0,1),(4,5),(8,9).

(b) S(b,c)=(1,2),(5,2),(5,6),(5,10),(13,10).

(c) T(c,d)=(2,3),(6,7)(10,11),(10,3)

The number of tuples in $(R * S) * T$, where $*$ is the full natural outer join, is:

A. 5

B. 8

C. 13

D. 60

78. Consider a relation R(A,B) and primary key is A and B is a foreign key referencing to A. Which of the following row sequence can be inserted into R.

A. (a1,a2)(a2,a3)(a3,a4)a4,a5)

B. (a1,null)(a2,a1)(a3,a2)(a4,a5)

C. (a1,null)(a2,a1)(a4,a3)(a3,a2)

D. None of the above can be inserted

79. The following table has two attributes X and Z, where X is the primary key and Z is the foreign key referencing X with on-delete cascade.

X	Z
2	4
3	4
4	3
5	2
7	2
9	5
6	4

The set of all tuples that are additionally deleted to preserve referential integrity when the tuple (2,4) is deleted are:

A. (3,4) and (6,4)

B. (5,2) and (7,2)

C. (5,2), (7,2) and (9,5)

D. (3,4), (4,3) and (6,4)

80. Consider the following tables T1 and T2:
In table T1, P is the primary key, Q is the foreign key referencing R in table T2

P	Q
2	2
3	8
7	3
5	5
6	9
1	1
9	8

T1

R	S
2	2
8	3
3	2
9	7
5	7
7	2

T2

with on-delete cascade and on-update cascade. In table T2, R is the primary key and S is the foreign key referencing P in the table T1 with on-delete set NULL and on-update cascade. In order to delete record (3,8) from table, number of additional records that need to be deleted from table T1 is

A. 0

B. 1

C. 2

D. 3

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