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**Previous Year Paper
2014**



Uttar Pradesh Power Corporation Limited

Subject : Computer Science Engg and Information Technology

Q.1

The first official Telegraph Line was opened between which two cities?

- 1) Kolkata and London
- 2) Bombay and Thane
- 3) Kanpur and Delhi.
- 4) Kolkata and Diamond harbor

Q.2

Which unique celestial event was observed on Earth in Tungusha in 1908?

- 1) Solar Eclipse for the longest time
- 2) Volcanic eruption of great magnitude
- 3) Launch of a space satellite to intercept a asteroid.
- 4) Bursting of a comet or asteroid in the Earth's atmosphere

Q.3

Which city has a museum dedicated to the Tribal Arts and Culture in India

- 1) Bhopal
- 2) Ranchi
- 3) Raipur
- 4) Bastar.

Q.4

What was the use of the MISRA YANTRA in the Jantar Mantar?

- 1) Finding the passage of constellations
- 2) Indicator of noon in a place
- 3) Making a prediction the Summer Solstice
- 4) Predicting an Eclipse

Q.5

Why was it necessary to have a National land records modernization programme?

- 1) There are today multiple agencies to manage land ownership and revenue.
- 2) Development requires detailed information on land transfers.
- 3) Equal compensation in all States needs to be identified.
- 4) Land records are kept by individuals and not safe.

Q.6

Where are the enclaves belonging to Bangladesh located in India?

- 1) Cooch Behar
- 2) Burdwan
- 3) Rangpur
- 4) Assam

Q.7

To whom was the Nobel Peace Prize 2013 given to ?

- 1) International atomic agency
- 2) Organisation for the prohibition of Chemical Weapons
- 3) Dennis Mukwege
- 4) Malala Yousoufzai

Q.8

Who among the following is not a recipient of Bharat Ratna?

- 1) Lal Bahadur Shastri
- 2) Netaji Subhash Chandra Bose
- 3) Dr. S.Radhakrishnan
- 4) Mrs. Indira Gandhi

Q.9

What is the percentage of cultivable area to total area in India ?

- 1) 22
- 2) 60
- 3) 40
- 4) 57

Q.10

Ginger is a stem because

- 1) It stores the food for the plant
- 2) It grows vertically in the soil
- 3) It doesn't contain chlorophyll
- 4) It has nodes and internodes

Q.11

What are the terms of the Rehabilitation and Resettlement Bill of 2011

- 1) 60 % consent of displaced persons
- 2) Priority for development of infrastructure and housing over industry.
- 3) Applicable for all types of development including irrigation
- 4) Compensation 4 times the market value of the land in rural areas

Q.12 What is the main reason for the formation of the BASIC ?

1. Developed countries take the lead in combating climate change and the effects thereof.
2. Developing countries reduce the emissions so that the climate change process is controlled.
3. Developed countries voluntarily control emissions so as to enable equity

- 1) 1,2
- 2) 1, 3
- 3) 1,2,3
- 4) 2,3

Q.13 In Which year , the voting age reduced to 18 from 21 years ?

- 1) 2000
- 2) 1986
- 3) 1996
- 4) 1989

Q.14 Against which country ,Sachin Tendulkar will be playing his last match before retiring from International Test cricket?

- 1) West Indies
- 2) Sri Lanka
- 3) Pakistan
- 4) Australia

Q.15 Which person's centenary of winning the Nobel Prize is commemorated in year 2013?

- 1) C.V. Raman
- 2) Rabindranath Tagore
- 3) S. Radhakrishnan
- 4) Chandrasekhar

Q.16 Which organ in the body controls pain but does not feel pain itself?

- 1) Heart
- 2) Liver.
- 3) Skin
- 4) Brain

Q.17

What is the use of Bittern?

- 1) Waste disposal additive as it decomposes
- 2) As a water purifier as it no sodium
- 3) As fertilizer as it is rich in potash
- 4) To make drinking water safe.

Q.18

Where did the Great Depression of Year 1929 start?

- 1) USA
- 2) England
- 3) Russia .
- 4) China

Q.19

For which reason, the Comet ISON is special ?

- 1) It is travelling towards the Sun
- 2) It has evidence of life
- 3) It left the Oort cloud millions of years ago.
- 4) The comet may shatter into pieces near Sun

Q.20

Which building in Kolkata, once the home of the junior officers of the East India Company is being renewed?

- 1) Writers building
- 2) Telephone Bhawan
- 3) Raj Bhavan
- 4) Royal Exchange

Q.1

Eight friends P, Q, R, S, T, U, V and Z are sitting in two rows with equal number in each. The members in one row face members in the other row. P sits facing north to the immediate right of W, who is exactly opposite of R. Z is to the immediate right of R and S is exactly opposite T who is to the immediate right of P. V is not at any of the ends of a row.

Which of the following members sit exactly opposite each other?

- 1) VW
- 2) VQ
- 3) PV
- 4) ZV

Q.2

How many parallelograms are there in the following figure?



- 1) 12
- 2) 30
- 3) 36
- 4) 28

Q.3

Four statements are followed by three conclusions numbered I, II and III. Assuming the statements to be true, even if they are at variance with commonly known facts, decide which of the conclusions logically follow?

Statements: (1) Some cats are lions; (2) Some tigers are bears; (3) No lion is a tiger;
(4) All bears are leopards.

Conclusions: I. All cats are either leopards or tigers.

- II. Some cats are leopards.
- III. Some tigers are leopards.

- 1) Only conclusion I follows
- 2) Only conclusion II follows
- 3) Both conclusions I and II follow
- 4) Only conclusion III follows

Q.4

Which is missing in the following sequence of letter clusters? .

adeg, bfhk, dilp, , krwc

- 1) hlpv
- 2) gmqv
- 3) fkot
- 4) glpv

Q.5

Choose the missing number from among the alternatives.

2	1	3
4	3	2
72	28	?

- 1) 35

- 2) 26
- 3) 42
- 4) 56

Q.6

If in a certain language, THURSDAY is written as HTVQTCY, and the word DOCUMENT is written as ODDTNNDT, how would the word COMPUTER be written in that language?

- 1) OCONSVRE
- 2) OCNOSVRE
- 3) OCNQVURE
- 4) OCNOVSRE

Q.7

$P \div Q$ means P is the wife of Q . $P \times Q$ means P is the father of Q . $P+Q$ means P is the son of Q . If $A \div C + D \times B$, then which of the following is false?

- 1) A is the sister-in-law of B
- 2) A is the daughter-in-law of D
- 3) A is the mother of B
- 4) B is either brother or sister of C

Q.8

If $'-$ ' denotes $'=$ ', $'x'$ denotes $'-$ ', $'+'$ denotes \div ', $'=$ ' denotes $+$ and \div ' denotes \times ', which of the following is incorrect?

- 1) $15+3 = 7-6 \div 2$
- 2) $8 \div 2-20+4 = 11$
- 3) $9x7 = 5 \div 2-12$
- 4) $6 \div 8+2-5 \div 4$

Comprehension:

A solid cube is painted red, blue and green on pairs of opposite faces. It is then cut into 36 smaller cubes such that 32 cubes are of the same size and 4 are of bigger size. No face of any of the bigger cubes is painted red. Answer the following questions.

Q.9

SubQuestion No. :1

How many cubes have only two faces painted?

- 1) 20
- 2) 24
- 3) 16
- 4) 8

Q.10

SubQuestion No. :2

How many cubes have at least one of their faces painted red or blue?

- 1) 16
- 2) 32
- 3) 36
- 4) 20

Q.11

If in each of the following numbers, the second digit is increased by 1 and the third digit is decreased by 2, and the positions of the first and the fourth digits are interchanged, which of the following will be the difference between the highest and the lowest numbers after rearrangement?

2257, 4537, 7568, 6247, 8567

- 1) 1321
- 2) 1891
- 3) 1315
- 4) 2643

Q.12

The first two letter clusters on the left of the sign ‘::’ are related in a certain way. The same relationship holds for the second pair on the right of the sign ‘::’ of which one is missing. Choose the missing one from among the alternatives.

BLOCK : LBPKA :: THIRD : ?

- 1) EQJIU
- 2) CSHIS
- 3) EQHIS
- 4) CQJIU

Q.13

Train A leaves the same station in the same direction 1 hour after Train B leaves with a speed six times as fast as that of B. After how long of A's departure, will A meet B?

- 1) data inadequate
- 2) 17.5 minutes
- 3) 15 minutes
- 4) 12 minutes

Q.14

Which is the odd number-pair?

- 1) 5-24
- 2) 8-65

- 3) 6-35
- 4) 4-15

Q.15 Prakash walks 9 meters towards North, turns left and walks 4 meters. Then he turns right and walks 15 meters. Finally, he turns left and walks 6 meters. How far is Prakash from the starting point?

- 1) 24 meters
- 2) data inadequate
- 3) 34 meters
- 4) 26 meters

Q.16 One of the numbers in the following number series is wrong. Which is the wrong term? .

857, 576, 765, 657, 543, 432, 321

- 1) 543
- 2) 657
- 3) 432
- 4) 765

Q.17 In a queue, Harish is 15th from the front and Harry is 18th from the end while Sabnam occupies the middle position between Harish and Harry. If there are 46 persons in the queue, how many persons are there between Harry and Sabnam?

- 1) 6
- 2) 5
- 3) 7
- 4) 8

Q.18 How many even numbers are there which are exactly divisible by its immediate preceding number but not exactly divisible by its immediate following number ?

2 8 4 2 3 9 3 6 9 5 8 4 8 3 6 2 8 3 9 3 4 8 6

- 1) 7
- 2) 5
- 3) 4
- 4) 6

Q.19 Which of the following groups of letters is the odd one out?

- 1) FMKRD
- 2) JMPTY
- 3) BFJLS
- 4) PRTXZ

Q.20 Two faces of a cube are given below. Which number will be opposite 5?



- 1) 3
- 2) 4
- 3) 1
- 4) 2

Comprehension:

रात को बादशाह अपने मंत्री के साथ वेश बदलकर शहर में घूमते थे । वे यह जानने का प्रयत्न करते थे कि उनके राज्य में लोग कैसा जीवन व्यतीत कर रहे हैं । वे दुखी लोगों की सहायता भी करते थे । उनके राज्य में चोरी, डकैती अथवा बेर्इमानी का नाम भी न था । उनकी प्रजा बहुत सुखी थी । सब लोग बादशाह के गुण गाया करते थे । एक रात को इसी प्रकार घूमते हुए बादशाह और मंत्री एक गली से निकले । एक झोपड़ी से उन्हें किसी के कराहने की ओवाज सुनाई दी ।

Q.1 SubQuestion No. :1

गुण गाना का अर्थ है -

- 1) गुण गाकर बताना
- 2) गुणों के बारे में गाना
- 3) गाते हुए प्रशंसा करना
- 4) प्रशंसा करना

Q.2 SubQuestion No. :2

रात में राजा घूम कर क्या जानना चाहते थे ?

- 1) उनके राज्य में चोरी होती है अथवा नहीं ?
- 2) लोग उनके ताजी में कैसा जीवन जी रहे हैं ?
- 3) कोई राजा को पहचानता है या नहीं ?
- 4) दुखी लोग कैसे रहते हैं ?

Q.3 SubQuestion No. :3

राज्य में कहीं भी चोरी और बेर्इमानी का नाम नहीं था क्योंकि -

- 1) राजा बहुत ईमानदार था
- 2) प्रजा बहुत ईमानदार थी.
- 3) मंत्री बहुत ईमानदार था
- 4) राज्य में सब समृद्ध थे.

Q.4

झूठा भय दिखाना को व्यक्त करने वाला मुहावरा है -

- 1) धमकी देना
- 2) धौंस देना
- 3) बन्दर घुड़की देना
- 4) भभकी देना

Q.5

कृपण शब्द का विलोम शब्द है -

- 1) महात्मा
- 2) उदार
- 3) महंत
- 4) डाटा

Q.6

सरकारी पत्र में सम्बोधन के बाद की पंक्ति होती है -

- 1) आपके ता. - के पत्र क्रमांक - के विषय में उल्लेख से की
- 2) आपके ता. - के पत्र क्रमांक - के अनुसार आपको आदेश दिया जाता है की
- 3) आपके ता.- के पत्र क्रमांक - के अधीन निवेदन है की
- 4) आपके ता. - के पत्र क्रमांक - के प्रसंग में मुझे कहने का आदेश हुआ है की

Q.7

कौन सा वाक्य शुद्ध है ?

- 1) रजनी तुम्हारा प्राण खतरा में हैं
- 2) रजनी तुम्हारे प्राण खतरे में हैं
- 3) रजनी तुम्हारे प्राण खतरा में है
- 4) रजनी तुम्हारा प्राण खतरे में हैं

Q.8

अहसान न मानने वाला वाक्यांश के लिए सही शब्द है -

- 1) अविश्वाशी
- 2) नास्तिक
- 3) कृतध्न
- 4) कृतज

Q.9 आँख का तत्सम रूप है-

- 1) इक्ष
- 2) श्रवण
- 3) अक्षि
- 4) दृश्य

Q.10 कौन सा शब्द अर्थ की वृष्टि से शेष शब्दों से भिन्न है ?

- 1) आकाश
- 2) नभ
- 3) द्योम
- 4) वितल

Q.1 Which of the following is/are fastest memory allocation policy?

- i. First Fit
- ii. Best Fit
- iii. Worst Fit
- iv. Next Fit

- 1) i and iv
- 2) ii and iii
- 3) i
- 4) iv

Q.2 Thread pools limit the number of threads that exist at any one point, hence :

- 1) serving all requests and ignoring many
- 2) not serving all requests and ignoring many
- 3) not letting the system resources like CPU time and memory exhaust
- 4) helping a limited number of processes at a time

Q.3

A computer based information system is needed because

- (i) The size of organization have become large and data is massive
- (ii) Timely decisions are to be taken based on available data
- (iii) Computers are available
- (iv) Difficult to get clerks to process data

- 1) (iii) and (iv)
- 2) (i) and (iv)

- 3) (ii) and (iii)
- 4) (i) and (ii)

Q.4

An 8-bit serial in/serial out shift register is used with a clock frequency of 100 kHz. What is the time delay between the serial input and the Q5 output?

- 1) 10 μ s
- 2) 50 μ s
- 3) 60 μ s
- 4) 40 μ s

Q.5

For a tree how many nodes have no ancestors?

- 1) 0
- 2) 3
- 3) 1
- 4) 2

Q.6

Which of the following is not the phase of compiler's code generation?

- 1) Instruction scheduling
- 2) Instruction decoding
- 3) Instruction selection
- 4) Register allocation

Q.7

In a system 3 processes are sharing 4 files. If each processes needs a maximum of 2 units then, deadlock

- 1) always occur
- 2) can never occur
- 3) has to occur
- 4) may occur

Q.8

Identify the permanent database object among the following.

(i) view (ii) table (iii) index

- 1) i, ii and iii
- 2) i and ii
- 3) i and iii
- 4) ii and iii

Q.9

To merge 4 sorted files having 10, 10, 10 and 10 records. How much time it will take?

- 1) $O(100)$
- 2) $O(64)$
- 3) $O(40)$
- 4) $O(10000)$

Q.10

A parser does not consists of

- 1) a parsing table
- 2) an input buffer
- 3) an output buffer
- 4) a stack

Q.11

Which of the phases is not applicable for the unified process?

(i) Inspection (ii) Elaboration
(iii) Construction (iii) Transition

- 1) (i), (ii) and (iii)
- 2) (i), (ii) and (iv)
- 3) (ii) and (iii)
- 4) (i) and (ii)

Q.12

To insert a node in a circular list at rear position, it should be inserted at

- 1) Rear position
- 2) Rear-1 position
- 3) Front-1 position
- 4) Front position

Q.13

Find the routing table. If node A is connected to B with weight 5, to node C with weight 2, and to node D with weight 3. Node C is connected to node A with weight 2, to node B with weight 4 and to node E with weight 4. Node B is connected to E with weight 3.

Node	Weight	Next Router
A	0	-
B	5	-
C	9	B
D	3	-
E	6	C

✗ 1)

Node	Weight	Next Router
A	0	-
B	5	-
C	2	-
D	3	-
E	6	C

✓ 2)

Node	Weight	Next Router
A	0	-
B	5	-
C	2	-
D	3	-
E	6	B

✗ 3)

Node	Weight	Next Router
A	0	-
B	5	-
C	2	-
D	3	-
E	6	-

✗ 4)

Q.14

Debugging is not a part of which of the following

- ✗ 1) Defect analysis
- ✗ 2) Defect resolution
- ✓ 3) Testing
- ✗ 4) Defect identification

Q.15

Which of the following is true for the amount of information travelling through a single channel at any one point of time.

- ✗ 1) bps
- ✗ 2) Data channel

3) Bandwidth
 4) Baud

Q.16 How many number of add and remove operations are required to access $x/2$ th element of a queue of 'x' elements, so that the original queue remains the same after the access is

1) $4*x$
 2) $8*x-1$
 3) $8*x$
 4) $4*x-1$

Q.17 A polynomial $P(x)$ satisfies the following

$$P(1)=P(3)=P(5)=1$$

$$P(2)=P(4)=1$$

The minimum degree of such polynomial is

1) 2
 2) 1
 3) 4
 4) 3

Q.18 What is the initial condition for a queue?

1) $\text{front}=\text{rear}=n$
 2) $\text{front}=\text{rear}=0$
 3) $\text{front}=\text{rear}=-1$
 4) $\text{front}=\text{rear}=1$

Q.19 There are two negative components having value of 80 and 40. What will be the output on adding the two components

1) 01111000
 2) 10001001
 3) 10001010
 4) 10001000

Q.20 Fibre distribution data interface (FDDI) does not support which of the following.

1) data encoding/decoding

2) transmission media
 3) fault tolerant transmission
 4) media access control

Q.21 Suppose Host A sends two TCP segments back to back to Host B over TCP connection. The first segment has a sequence number 90, the second has a sequence number 110. Suppose that the first segment is lost but second segment arrives at B. In the acknowledgement that the Host B sends to Host A. What will be the acknowledgement number and how much data is in first segment.

1) 90, 10 bytes
 2) 110, 200 bytes
 3) 110 20 bytes
 4) 90, 20 bytes

Q.22 The fundamental process state which is not a part of the process

1) Ready
 2) terminating
 3) blocked
 4) executing

Q.23 The scripting technologies not used at server site.

1) JSP
 2) ASP
 3) HTML
 4) PHP

Q.24 Consider a system with 80% hit ratio, 50 nano-seconds time to search the associative registers , 750 nano-seconds time to access memory. What is the effective memory access time

1) 2350 ns
 2) 950 ns
 3) 640ns
 4) 310 ns

Q.25 Let $S = \{0, 1\}$. The number of possible strings of length ' m ' that can be formed by the elements of the set S is

1) $m!$
 2) 2^m

3) m^2
 4) $m+1$

Q.26 Which of the following does not have probabilistic acceptance?

1) omega automaton
 2) geometric automaton
 3) quantum finite automaton
 4) metric automaton

Q.27 A computer consists of a processor and I/O device connected to main memory M via a shared bus with a data bus width of one word. The processor can execute maximum 106 instructions per second. An average instruction requires five machine cycles, three of which use the memory bus. A memory read or write operation uses one machine cycle. Suppose that the processor is continuously executing program that require 95% of its instruction execution rate but not any I/O instructions. Assume that one processor cycle equals one bus cycle. Now suppose the I/O device is to be used to transfer large blocks of data between M and D.

If programmed I/O is used and each one word I/O transfer requires the processor to execute two instructions estimate the maximum I/O data transfer rate, in words per second, possible through D

1) 1000000 words/second
 2) 25000 words/second
 3) 50000 words/second
 4) 20000 words/second

Q.28 The addressing mode in which no memory reference other than instruction fetch is required to obtain the operand

1) Direct address
 2) Register address
 3) Immediate address
 4) Register Indirect address

Q.29 A finite-state machine with no output function at all is known as

1) a nullautomaton
 2) a fullautomaton
 3) a dummyautomaton
 4) a semiautomaton

Q.30 Find the check bit in the message 111101 using Hamming code.

- 1) 1101
- 2) 0101
- 3) 1001
- 4) 0001

Q.31 While calculating the running time of external sorting the sorting process involves the following times to complete the entire task

- 1) Read, Rewind and Update
- 2) Read, Write and Update
- 3) Write, Rewind and Update
- 4) Read, Write and Rewind

Q.32 The following codes were generated by a machine 0010, 1000, 1011, 1111, The logic 1 indicates the presence of the code and for the non presence of code it is logic 0. What will be the logic with a single output.

- 1) $A'B'CD' + AB'C'D' + AB'CD + ABCD$
- 2) $A'B'CD' + AB'C'D' + ACD$
- 3) $A'B'CD' + AB'C'D' + ABD$
- 4) $A'B'CD' + AB'C'D' + AB'C'D + ACD$

Q.33 What will be the number of leaf nodes in a complete binary tree if depth is m.

- 1) $2m$
- 2) $2^m + 1$
- 3) m
- 4) 2^m

Q.34 The largest element of an array index is called.....

- 1) middle bound
- 2) lower bound
- 3) range
- 4) upper bound

Q.35

A hash function h defined as $h(k) = k \bmod 7$, with linear probing, insert the keys 37, 38, 72, 48, 98, 11, 56, into a table indexed from 11 will be stored in the location

- 1) 3

<input checked="" type="checkbox"/>	2) 7
<input checked="" type="checkbox"/>	3) 2
<input checked="" type="checkbox"/>	4) 5

Q.36 Which Boolean expression represents the following statements. The outcome of three events are as follow. When all or any two events occur then it is 1 and for the remaining it is 0.

<input checked="" type="checkbox"/>	1) $AB + BC + ABC$
<input checked="" type="checkbox"/>	2) $A'BC + AB + AC$
<input checked="" type="checkbox"/>	3) $AB+BC+AC$
<input checked="" type="checkbox"/>	4) $AC + BC + ABC'$

Q.37 What is the minimum number of stacks of size 10 required to implement a queue to size 10?

<input checked="" type="checkbox"/>	1) 10
<input checked="" type="checkbox"/>	2) 20
<input checked="" type="checkbox"/>	3) 40
<input checked="" type="checkbox"/>	4) 30

Q.38 Which of the following option is correct about aspects of Fault-Tolerance?

- (i) Fault detection
- (ii) Damage assessment
- (iii) Fault recovery
- (iv) Fault prediction

<input checked="" type="checkbox"/>	1) (i), (ii) and (iii)
<input checked="" type="checkbox"/>	2) (i) and (ii)
<input checked="" type="checkbox"/>	3) (ii) and (iii)
<input checked="" type="checkbox"/>	4) (i), (ii) and (iv)

Q.39

The task of the parser is essentially to determine if and how the input can be derived from the start symbol of the grammar. This can be done in

- (i)Top-down parsing (ii) Bottom-up parsing (iii) random parsing

<input checked="" type="checkbox"/>	1) i
<input checked="" type="checkbox"/>	2) ii
<input checked="" type="checkbox"/>	3) i, ii and iii



4) i and ii

Q.40

Which system is not true when Multiprocessor systems are classified according to the manner in which CPUs and memory units are associated with one another

- 1) NUMA
- 2) NORMA
- 3) UMA
- 4) NOMA

Q.41

How many NAND gates are required to construct a half adder

- 1) 8
- 2) 7
- 3) 6
- 4) 5

Q.42

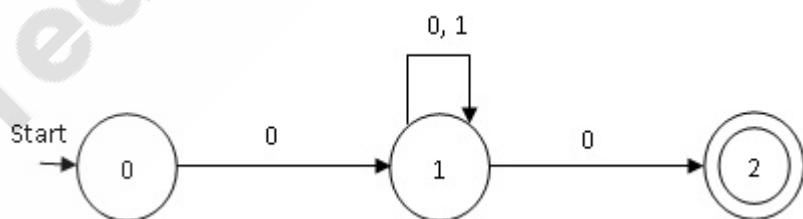
To which IEEE family does WiMAX belong

- 1) 802.14
- 2) 802.13
- 3) 802.16
- 4) 802.11

Q.43

The Nondeterministic Finite Automata (NFA) is shown below. Identify the correct

regular expression.



- 1) $0(01)^*0$
- 2) $0(0)^*0$
- 3) $0(10)^*0$
- 4) $0(0|1)^*0$

Q.44

For a given formal language, what is the smallest automaton that recognizes it?

(i) Minimization (ii) Determinization (iii) Maximization

- 1) i and iii

- 2) ii
- 3) i, ii and iii
- 4) i

Q.45

The syntax for writing the minimum occurrence for an element is

- 1) `<xsd:elements ref=" note" minOccurs=" 0"/>`
- 2) `<xsd:element ref=" note" min=" 0"/>`
- 3) `<xsd:elements ref=" note" min=" 0"/>`
- 4) `<xsd:elements ref=" note" minOccur="0"/>`

Q.46

The encryption and compression are done by which layer

- 1) Session Layer
- 2) Application layer
- 3) Transport Layer
- 4) Presentation layer

Q.47

A hash table has space for 100 records. What is the probability of collision before the table is 5% full?

- 1) 0.10
- 2) 0.40
- 3) 0.25
- 4) 0.20

Q.48

Which of the following is not a lexical analyzer?

- 1) Quex
- 2) Lexx+
- 3) JavaCC
- 4) JLex

Q.49

Let LASTPOST, LASTIN and LASTPRE denotes the last vertex visited in a postorder, inorder and preorder traversal respectively of a complete binary tree. Which of the following is always true?

- 1) LASTIN =LASTPOST
- 2) LASTIN =LASTPOST=LASTPRE

	3) LASTIN =LASTPRE
	4) LASTPRE =LASTPOST

Q.50

A program on a particular computer takes 50ns to execute. The computer spends 80 percent of its time in execution. The manufacturer makes a change by a factor 8 to enhance the performance. What is the execution time after the change?

	1) 41.25s
	2) 15s
	3) 30s
	4) 82.5s

Q.51

Find the output for the given code

```
#include
int main()
{
char *ptr = 0;
*ptr = 'A';
printf("value in pointer ptr is %c\n", *ptr);
return 0;
}
```

	1) 65
	2) compile time error
	3) 0
	4) Null pointer assignment

Q.52

Design a hard disk with 32 GB capacity. The hard disk should have 1024 byte sectors, 2048 sectors/track and 4096 tracks/platter. How many platters are required ?

	1) 6
	2) 4
	3) 5
	4) 3

Q.53

Match the following

(i)	SMTP	P	Application Layer
(ii)	BGP	Q	Transport Layer
(iii)	TCP	R	Data Link Layer
(iv)	PPP	S	Network Layer

1) (i)-P, (ii)-S, (iii)-R (iv)-Q
 2) (i)-P, (ii)-R, (iii)-Q (iv)-S
 3) (i)-Q, (ii)-R, (iii)-S (iv)-P
 4) (i)-P, (ii)-R, (iii)-S (iv)-Q

Q.54 At a particular time of computation, the value of a counting semaphore is 7. Then 20 P operations and 'n' V operations were completed on this semaphore. If the final value of the semaphore is 5, 'n' will be

1) 21
 2) 18
 3) 19
 4) 20

Q.55 Which of the following generated by the following context-free grammar

$$S \rightarrow bSbb \mid A$$

$$A \rightarrow aA \mid \epsilon$$

1) $\{b^n a^m b^{2n} : n \geq 0, m \geq 0\}$
 2) $\{b^{2n} a^m b^n : n \geq 0, m \geq 0\}$
 3) $\{b^n a^m b^n : n \geq 0, m \geq 0\}$
 4) $\{b^{2n} a^m b^{2n} : n \geq 0, m \geq 0\}$

Q.56 Which combinational circuit can implement any Boolean expression.

1) Multiplexer
 2) Encoder
 3) Comparator
 4) Multiplier

Q.57 Which attack involves change in DNS entries so that users are directed to invalid site

1) Phishing
 2) Masquerade
 3) Worm
 4) Pharming

Q.58 What is the sum of the degree of each vertex for an undirected graph with m vertices and n edges?

1) $(2n-1) / 2$

- 2) mn
- 3) 2n
- 4) 2m

Q.59 An application has the following specifications. 10 low external inputs, 12 high external outputs, 20 low internal logical files, 15 high external interface files, 12 average external enquiries, and a value complexity adjustment factor of 1. What is the final adjusted functional point?

- 1) 452
- 2) 404
- 3) 402
- 4) 59

Q.60 A binary tree contains the value 1, 2, 3, 4, 5, 6, 7, 8. The tree is traversed in preorder and the values are printed out. Which of the following sequence is a valid output?

- 1) 5 3 1 2 4 7 8 6
- 2) 5 3 1 2 6 4 7 8
- 3) 5 3 1 2 4 7 6 8
- 4) 5 3 2 4 1 7 8 6

Note: This question has been ignored

Q.61 Optimization can be

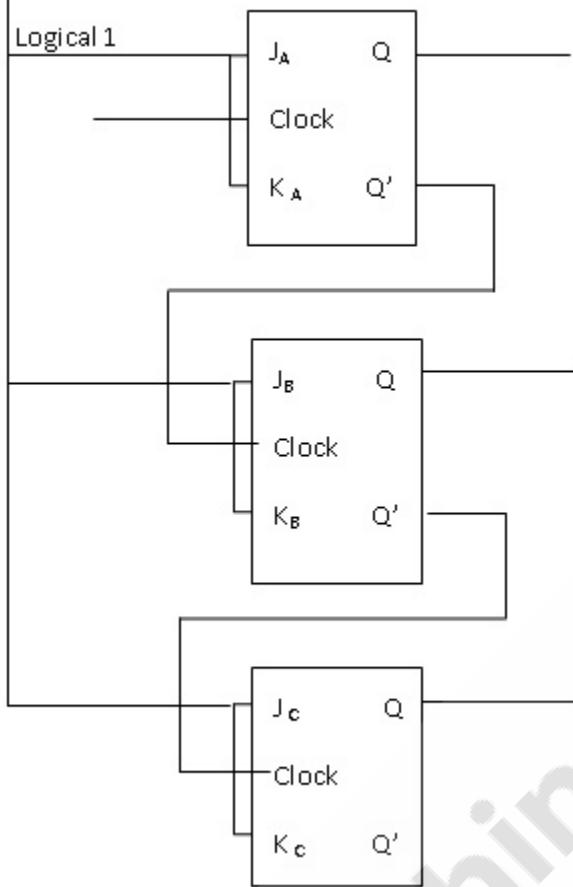
- 1) automated by compilers but not performed by programmers
- 2) automated by compilers or performed by programmers
- 3) performed by programmers
- 4) automated by compilers

Q.62 An organization wants to implement policies for its web pages. It allows access to those who had previous association with it and deny others. What is the solution it must adopt

- 1) SSL
- 2) Packet filter firewall
- 3) Firewall
- 4) Proxy Firewall

Q.63

A counter has been designed using JK Flip Flop which among the given option is correct.



- 1) Mod 7 counter
- 2) Counts from 7 to 1
- 3) Counts from 0 to 7
- 4) Counts from 7 to 0

Q.64

What will be the value returned by the following function, when it is called with a value 15?

```
int abc(int n){
if (( n/2 ) !=0)
return ( abc(n/2 ) * 10 + n%2 );
else return 1;}
```

- 1) 1111
- 2) 1011
- 3) 0111
- 4) 0101

Q.65

The memory hierarchy has a hit rate of 80 percent and memory request takes 10ns to

complete and memory miss takes 100ns to complete. What is the average access time of the level

- 1) 28s
- 2) 28ns
- 3) 28ms
- 4) 280ns

Q.66 During a recursive call, all static variables

- 1) maintained in a stack
- 2) maintained in a queue
- 3) initialized during each execution of the function
- 4) retained from the last execution

Q.67 Which is true for canonical form?

- 1) A SOP expression
- 2) A POS expression
- 3) A SOP or POS expression with all the literals in each term
- 4) All literal present in the expression

Q.68 The following is a simple Context-free grammar which can describe a language made up of.....

$\text{Expr} \rightarrow \text{Expr} + \text{Term}$

$\text{Expr} \rightarrow \text{Term}$

$\text{Term} \rightarrow \text{Term} * \text{Factor}$

$\text{Term} \rightarrow \text{Factor}$

$\text{Factor} \rightarrow (" \text{ Expr } ")$

$\text{Factor} \rightarrow \text{integer}$

- 1) increment of integers
- 2) multiplication of integers
- 3) addition of integers
- 4) multiplication and addition of integers

Q.69 The principals used in hardwired logic approach of a control unit are

- (i) The control unit is viewed and designed as a combinational and sequential logic circuit.
- (ii) The control unit is implemented by using any of a variety of standard digital logic techniques. The logic circuit generates the fixed sequences of control

signals.

(iii) This approach is used to generate fixed sequences of control signals with the higher speed

(iv) The control unit is which controls all the processor operation sequence

- 1) ii and iv
- 2) i and ii
- 3) i and iv
- 4) i, ii and iii

Q.70

What is a relation?

(i) a subset of a Cartesian product
(ii) an unordered set of ordered tuples
(iii) a collection of related data

- 1) i and iii
- 2) i, ii and iii
- 3) i and ii
- 4) ii and iii

Q.71

Which of the following is not a step of design process

- 1) Logical design
- 2) Conceptual design
- 3) Planning and analysis
- 4) Testing

Q.72

A circular list can be used to represent

- 1) Graph
- 2) Stack
- 3) Queue
- 4) Tree

Q.73

When several processes access the same data concurrently and the outcome of the execution depends on the particular order in which the access takes place, is called

- 1) critical condition
- 2) dynamic condition

3) race condition
 4) Semaphore condition

Q.74 Regular languages are very useful in

(i) input parsing (ii) programming language design (iii) operating system design

1) i and iii
 2) ii and iii
 3) i and ii
 4) i, ii and iii

Q.75 How many categories did Flynn describe the computers

1) 3
 2) 4
 3) 1
 4) 2

Q.76 To sort 1000 names in a superscalar machine it takes approx 100 nsec using quick sort. The minimum time needed to sort 100 names will be approximately

1) 7.4 nsec
 2) 5.5 nsec
 3) 6.7 nsec
 4) 6.2 nsec

Q.77 The simplified expression for $F(A,B,C,D) = \sum 3,4,5,7,9,13,14,15 + \sum d (0,2,8,10)$ is

1) $A'BC' + A'CD + AC'D + ABC + BD$
 2) $A'BC' + A'CD + AC'D + ABC$
 3) $A'C'D' + A'B'C + AB'C' + AC'D'$
 4) $A'C'D' + A'B'C + AB'C' + AC'D' + BD$

Q.78 The boolean expression $Y = (((ABC)' + A'B)' + BC)'$ is equivalent to

1) $B' + C'$
 2) $B'C'$
 3) $B + C'$
 4) $B' + C$

Q.79

In software requirement which approach is not used in analysis model.

- 1) PSL/PSA
- 2) Prototyping
- 3) Analysis patterns
- 4) Structural analysis

Q.80

When used with an IC, what does the term "QUAD" indicate?

- 1) 4 Circuits
- 2) 6 Circuits
- 3) 8 Circuits
- 4) 2 Circuits

Q.81

The NCNames derives from what set of names

- 1) Any names conforming to XML Names, minus the colon
- 2) Any set of names for XML documents pertaining to a particular vocabulary
- 3) Any names for elements and attributes within the DTD to which the namespace refers
- 4) Any combination of characters allowable in XML

Q.82

On the basis of the given 'C' code, which of the following is the correct order?

$x = (f(3) * g(5)) + h();$

- 1) f, g, h
- 2) h, f, g
- 3) g, f, h
- 4) h, g, f

Q.83

Which of the action is not performed by the processor when an interrupt request is received or exception occurs

- (i) It pushes the processor status register, the current segment register(CS) and the instruction pointer on the processor stack pointed to by the processor stack pointer.
- (ii) In case of an exception resulting from an abnormal execution condition it pushes a code on the stack describing the cause of the exception.
- (iii) It clears the corresponding interrupt-enable flag, if appropriate, so that further interrupts from the same source are disabled.

(iv) It fetches the address of the interrupt-service routine from the vector processor and loads this value into instruction pointer.

- 1) i, ii and iii
- 2) i and ii
- 3) i, ii and iv
- 4) i and iii

Q.84

The canonical example of a context free grammar is parenthesis matching. Let us consider an example in which two different kinds of matching nested parentheses, described by the productions:

$$\begin{aligned}S &\rightarrow SS \\S &\rightarrow () \\S &\rightarrow (S) \\S &\rightarrow [] \\S &\rightarrow [S]\end{aligned}$$

with terminal symbols [] () and nonterminal S. The following sequence can be derived in that grammar:

- 1) ([[[00 []]] []])
- 2) ([[[00 []]] ([])])
- 3) ([[[00 []]] ([])])
- 4) ([[[00 []]] ([])])

Q.85

Consider the following regular expression:

$$a^* (ab)^* (abc)^*$$

Which of the following regular expressions denote the same language as the above regular expression?

- 1) $(a+ab+abc)^*$
- 2) $a^*+(ab) + (abc)$
- 3) $a^* (+ab)^* (\emptyset+abc)^*$
- 4) $a^*+(ab)^*+ (abc)^*$

Q.86

A two-way set associative cache memory uses blocks of four words. The cache can accommodate a total of 2048 words from the main memory. The main memory size is 32 x 128 K.

What is the word length of cache memory

- 1) 39 bits

- 2) 14 bits
- 3) 69 bits
- 4) 78 bits

Q.87 What is the logical address in bits of page number and page offset. If the higher order represents the page number and lower order page offset. The size of logical address space is 4 to the power of p and a page size is 4 to the power of q addressing units

- 1) $p-q, p$
- 2) q, p
- 3) p, q
- 4) $p-q, q$

Q.88 What is the worst case time complexity of Bubble sort, if the list of n elements is already sorted?

- 1) $O(n)$
- 2) $O(\log_2 n)$
- 3) $O(n \log_2 n)$
- 4) $O(n^2)$

Q.89 Link lists are not suitable for

- 1) Polynomial manipulation
- 2) Binary search
- 3) Radix sort
- 4) Insertion sort

Q.90 For a relation the number of tuples is called

- 1) Degree
- 2) Cardinality
- 3) Columns
- 4) Rows

Q.91 A complete graph with n vertices has at least

- 1) $2^{n-1}-1$ spanning trees
- 2) 2^{n-1} spanning trees
- 3) $2n$ spanning trees
- 4) 2^{n+1} spanning trees

Q.92

A functional dependency FD: $X \rightarrow Y$ is called trivial if Y is a subset of X.

- 1) if Y is a subset of X
- 2) if Y is a superset of X
- 3) if X is a subset of Y
- 4) if X is a superset of y

Q.93

Which is not true about XML

- 1) It can separate data from HTML
- 2) It is designed to display data
- 3) It is free and extensible
- 4) It is actually meta language

Q.94

Duplicate rows are eliminated using

- 1) ELIMINATE
- 2) NODUPLICATE
- 3) DISTINCT
- 4) UNIQUE

Q.95

Which of the following is not applicable to digital signature

- 1) confidentiality
- 2) non repudiation
- 3) integrity
- 4) authentication

Q.96

Convert the given number $(432)_5 = (?)_7$

- 1) 252
- 2) 117
- 3) 225
- 4) 224

Q.97

For a relation R, R (W, X, Y, Z) and F = {W \rightarrow X, X \rightarrow Y, Y \rightarrow W} is the set of functional dependency. Determine the key of relation?

- 1) Z
- 2) Y
- 3) X
- 4) W

Note: This question has been ignored

Q.98 If a company charges 10% for the software system as Annual Change Traffic which involve 600 PMs as development effort. What will be the Annual Maintenance effort if lifetime of the project is 10 years?

- 1) 500 PM
- 2) 600 PM
- 3) 200 PM
- 4) 800 PM

Q.99 If $n = 10$ then total memory locations is

- 1) 1 KB
- 2) 1 MB
- 3) 512 B
- 4) 10 KB

Q.100 In E-R Diagram an attribute is represented by

- 1) Dashed ellipse
- 2) Rectangle
- 3) Triangle
- 4) Ellipse

Q.101 An m -way search tree T is a tree in which all the nodes are of degree

- 1) Degree $\leq m$
- 2) Degree $= m+1$
- 3) Degree $= m$
- 4) Degree $\geq m$

Q.102 Which of the following is incorrect?

- 1) The Entity-Relation Model (ER) is the most common method used to build data models for relational databases.
- 2) The basic constructs of the ER model are entities and attributes.
- 3) Entities contain descriptive information.
- 4) The Entity-Relationship Model is a conceptual data model that views the real world as consisting of entities and relationships. The model visually represents these concepts by the Entity-Relationship diagram.

Q.103

Which of the following is the most common method for enforcing data integrity?

- 1) Constraints

- 2) Cursors
- 3) Triggers
- 4) Stored Procedure

Q.104 Data dictionary contains

(i) name (ii) width (iii) data type

- 1) i and ii
- 2) ii and iii
- 3) i and iii
- 4) i, ii and iii

Q.105 The maximum number of key values that a node in a B tree of order m can have is

- 1) $2m$
- 2) m
- 3) $m-1$
- 4) $m+1$

Q.106 How many bits are in Header Checksum of IPv4 datagram format

- 1) 16
- 2) 2
- 3) 4
- 4) 8

Q.107 For an algorithm the running time is given by $T(n)=T(n-1)+T(n-2)+T(n-3)-T(n-4)$, if $n>4 = n$

otherwise, the order of this algorithm is

- 1) $\log n$
- 2) n
- 3) n^2
- 4) 2^n

Q.108 Which of the following is not to a binary tree?

- 1) Heap
- 2) AVL-Tree
- 3) B-Tree

 4) Search tree

Q.109 Optimizing an Finite-state machine(FSM) means finding the machine with the

-  1) minimum number of states that performs the same function
-  2) minimum number of states that performs the dissimilar function
-  3) maximum number of states that performs the same function
-  4) maximum number of states that performs the dissimilar function

Q.110 To obtain better memory utilization, dynamic loading is used. With dynamic loading, a routine is not loaded until it is called. For implementing dynamic loading,

-  1) special support from hardware is required
-  2) user programs can implement dynamic loading without any special support from hardware or operating system
-  3) special support from operating system is essential
-  4) special support from both hardware and operating system is essential

Q.111 If the page reference string is 1, 2, 1, 3, 7, 4, 5, 6, 3, 1. How much page fault occur using optimal page replacement policy?

-  1) 7
-  2) 4
-  3) 8
-  4) 6

Q.112 How many bits are required in the operation code. If a Computer uses a memory unit with 1 M words of 32 bits each. A binary instruction code is stored in one word of memory. The instruction has four parts: an indirect bit, an operation code, a register code part to specify one of 64 registers, and an address part.

-  1) 7
-  2) 6
-  3) 20
-  4) 5

Q.113

Consider Ent1 and Ent2 be the two entities with simple single-valued attributes. R1 and R2 are two relationships between Ent1 and Ent2, where R1 is one-to-many and R2 is many-to-many. R1 and R2 do not have any attributes of their own. What is the minimum number of tables required to represent this situation in the relational model?

-  1) 2
-  2) 5

- 3) 3
- 4) 4

Q.114 Which device creates big collision domain and one large broadcast domain

- 1) Switch
- 2) Bridge
- 3) Router
- 4) Hub

Q.115 In order to begin constructing the basic model, the modeler must analyze the information gathered during the requirements analysis for the purpose of

- (i) Adding business and integrity rules to the Model
- (ii) Identifying and defining relationships between entities
- (iii) Classifying data objects as either entities or attributes

- 1) i and ii
- 2) ii and iii
- 3) i, ii and iii
- 4) i and iii

Q.116 The prefix form of $A+B/ (C * D \wedge E)$ is

- 1) $+ABCD*^DE$
- 2) $+A/B*C^DE$
- 3) $+/*^ACBDE$
- 4) $+A/BC*^DE$

Q.117 Which design technique is used by merge sort algorithm?

- 1) Backtracking
- 2) Divide and Conquer
- 3) Greedy
- 4) Dynamic programming

Q.118 Consider a project for which the manpower requirement is 200 PY and the development time is 2 years. What is the peak manning? (Assume $e=2$)

- 1) 59
- 2) 64
- 3) 50

 4) 40

Q.119 Any sorting algorithm that sorts a list of n keys with comparisons of keys must, in its average case performs at least

-  1) n comparisons of keys
-  2) $\log n$ comparisons of keys
-  3) $[\log 2n!]$ comparisons of keys
-  4) n^2 comparisons of keys

Q.120 In the instruction given below which type of Data hazards occur

MULTD R0, R2, R4 and DIVD R10, R0, R6

-  1) RAR
-  2) WAR
-  3) RAW
-  4) WAW

Q.121 If the Binary search algorithm determines that the search argument is in the lower half of the array, which of the following statements will set the appropriate variable to the appropriate value.

-  1) start sub = middle sub - 1
-  2) start sub = middle sub + 1
-  3) stop sub = middle sub - 1
-  4) stop sub = middle sub + 1

Q.122 Evaluate the expression $6*5^4*3^2*1$

-  1) 33750
-  2) 34750
-  3) 35750
-  4) 4320

Q.123 A binary tree in which every non-leaf node has non-empty left and right subtrees is called a strictly binary tree. Such a tree with 20 leaves

-  1) cannot have more than 37 nodes
-  2) cannot have more than 39 nodes
-  3) has exactly 39 nodes
-  4) has exactly 37 nodes

Q.124 Joining a table with itself is called

- 1) Self Join
- 2) Equi Join
- 3) Outer Join
- 4) Join

Q.125 What is the function performed by the $G = A + B + 1$ in the ALU operations

- 1) Add A, B and increment
- 2) Add with Increment B
- 3) Addition
- 4) Add with carry input of 1

Q.126 In a paged memory, the page hit ratio is 0.35. The required to access a page in secondary memory is equal to 100 ns. The time required to access a page in primary memory is 10 ns. The average time required to access a page is :

- 1) 68.5 ns
- 2) 78.5 ns
- 3) 68.0 ns
- 4) 3.0 ns

Q.127 Which of the following are TRUE for direct communication

- i) A communication link can be associated with N number of process
- ii) A communication link can be associated with exactly two processes
- iii) Exactly $N/2$ links exist between each pair of processes
- iv) Exactly one link exists between each pair of processes

- 1) iii and iv
- 2) ii and iv
- 3) i and iii
- 4) i and ii

Q.128 The following grammar

$$\begin{aligned}G &= (N, T, P, S) \\N &= \{S, A, B, C\} \\T &= \{a, b, c\}\end{aligned}$$

$P : S \rightarrow aS$
 $A \rightarrow bB$
 $B \rightarrow cC$
 $C \rightarrow a$
is

- 1) is type 3
- 2) is type 1 but not type 2
- 3) is type 2 but not type 3
- 4) is type 0 but not type 1

Q.129 Which is the most reliable topology

- 1) Ring topology
- 2) Star topology
- 3) Mesh topology
- 4) Bus topology

Q.130 How many flip flops are required by twisted ring counter for modulo N counter

- 1) n
- 2) $n+1$
- 3) $n-1$
- 4) $n/2$

Q.131 For a sorted list the best sorting algorithm is

- 1) Quick Sort
- 2) Insertion Sort
- 3) Selection Sort
- 4) Bubble Sort

Q.132 Which of the following sorting algorithm has the worst time complexity of $n \log(n)$?

(i) Insertion sort (ii) Heap sort (iii) Merge Sort (iv) Quick Sort

- 1) ii and iv
- 2) i and iv
- 3) ii and iii
- 4) i and ii

Q.133

If in a five stage ripple counter is to be designed using flip flop with transition time

20ns. What is the input frequency at which this counter will operate.

- 1) 100 MHz
- 2) 10 MHz
- 3) 10 KHz
- 4) 1 MHz

Q.134 For a given current state and an input symbol, if an automaton can only jump to one and only one state then it is a

- 1) Nondeterministic automaton
- 2) Deterministic automaton
- 3) Alternation
- 4) Semi automaton

Q.135 What mask would you assign to the network ID of 172.16.0.0? If more than 300 hosts with each subnet fewer than 500.

- 1) 255.255.255.0
- 2) 255.255.0.0
- 3) 255.255.252.0
- 4) 255.255.254.0

Q.136 For which operation both P and NP are closed.

- 1) Kleene
- 2) Intersection
- 3) Join
- 4) Union

Note: This question has been ignored

Q.137 What is the memory address of fifth element when word size is w?

- 1) Address of A[5]=Base(A)+w(5-lower bound)
- 2) Address of A[5]=Base(A)+w(5+upper bound)
- 3) Address of A[5]=Base(A)+w(6-lower bound)
- 4) Address of A[5]=Base(A)+w(6-upper bound)

Q.138

Assume a page reference string for a process with m frames (initially all empty). The page reference string has length p with n distinct page numbers occurring in it. For any page-replacement algorithms, what is a lower bound & an upper bound on the number of page faults?

- 1) $n/2, p$

- 2) p, n
- 3) $n, p/2$
- 4) n, p

Q.139 The state machines can be subdivided into

- 1) Transducers, Acceptors and Sequencers
- 2) Transducers, Acceptors, Classifiers and Sequencers
- 3) Transducers, verifier, Classifiers and Sequencers
- 4) Transducers, Acceptors, and Classifiers

Q.140 In a six stage pipeline assuming that there is no branch instructions. If we want to execute 15 instructions. What is time required to execute these instructions.

- 1) 16
- 2) 15
- 3) 21
- 4) 20

Q.141 Mc Call's quality factors are characterised using three aspects name them

- 1) Processes, revision, transition
- 2) Management, Operation, transition
- 3) Operation, revision, transition
- 4) Management, Operation, revision

Q.142 The number of nodes in a complete binary tree of level 5 is

- 1) 64
- 2) 63
- 3) 67
- 4) 32

Q.143 How many comparisons are required to sort an array of length 5 if the straight selection sort is used and the array is already sorted in opposite order?

- 1) 1
- 2) 20
- 3) 0
- 4) 5

Q.144

The tag used to link document together is

- 1) < HREF = " HTTP ://www. dell.com" >company
- 2) <HREF = " HTTP ://www. dell.com>company
- 3) company
- 4) company

Q.145 Which among the following is correct for the causes of pipeline conflict in pipelined processor?

- (i) Resource (ii) Data dependency
- (iii) Branch difficulties (iv) control dependency

- 1) i and iii
- 2) i, ii, iii ,iv
- 3) i and ii
- 4) i, ii, iii

Q.146 Which of the following is not a black box testing?

- 1) Glass box testing
- 2) Equivalence partitioning
- 3) Graph-Based testing
- 4) Comparison testing

Q.147 Let the following functional dependencies hold for relation R1(A, B, C) and R2(B, D, E)
 $B \rightarrow A$, $A \rightarrow C$, the relation R1 contains 35 tuples and relation R2 contains 34 tuples. What is maximum number of tuples possible in natural join R1 and R2?

- 1) 35
- 2) 36
- 3) 34
- 4) 33

Q.148 A process that is based on IPC mechanism which executes on different systems and can communicate with other processes using message based communication, is called

	1) Remote Machine Invocation
	2) Inter Process Communication
	3) Remote Procedure Call
	4) Local Procedure Call

Q.149 What is the broadcast address of the subnet address 172.16.99.99, 255.255.192.0

	1) 172.16.99.255
	2) 172.16.64.127
	3) 172.16.127.255
	4) 172.16.255.255

Q.150

Identify the correct match from the following

Grammar	Languages
Type-0	Recursively enumerable
Type-1	Context-sensitive
Type-2	Context-free
Type-3	Regular

1)

Grammar	Languages
Type-0	Context-sensitive
Type-1	Recursively enumerable
Type-2	Regular
Type-3	Context-free

2)

Grammar	Languages
Type-0	Recursively enumerable
Type-1	Regular
Type-2	Context-sensitive
Type-3	Context-free

3)

4) 

Grammar	Languages
Type-0	Recursively enumerable
Type-1	Context-sensitive
Type-2	Regular
Type-3	Context-free

