



Post Graduate School
Indian Agricultural Research Institute, New Delhi
Examination for Admission to Ph.D. Programme 2013-2014

Discipline : Computer Application

Discipline Code : 09

Roll No.

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Please Note:

- (i) This question paper contains **13** pages. **Please check whether all the pages are printed in this set.** Report discrepancy, if any, **immediately** to the invigilator.
- (ii) **There shall be NEGATIVE marking for WRONG answers in the Multiple Choice type questions (No. 1 to 130) which carry one mark each. For every wrong answer 0.25 mark will be deducted.**

PART – I (General Agriculture)

Multiple choice questions (No. 1 to 30). Choose the correct answer (a, b, c or d) and enter your choice in the circle (by shading with a pencil) on the OMR - answer sheet as per the instructions given on the answer sheet.

1. Who is the present Chairman of Protection of Plant Varieties and Farmers' Right Authority (PPV&FRA)?
 - a) Dr. R.R. Hanchinal
 - b) Dr. P.L. Gautam
 - c) Dr. S. Nagarajan
 - d) Dr. Swapan K. Datta
2. Which among the following is another name for vitamin B₁₂?
 - a) Niacin
 - b) Pyridoxal phosphate
 - c) Cobalamin
 - d) Riboflavin
3. The largest share in India's farm export earning in the year 2011-12 was from
 - a) Basmati rice
 - b) Non-basmati rice
 - c) Sugar
 - d) Guar gum
4. The National Bureau of Agriculturally Important Insects was established by ICAR in _____, was earlier known as _____.
 - a) Bangalore; PDBC
 - b) New Delhi; National Pusa Collection
 - c) Ranchi; Indian Lac Research Institute
 - d) New Delhi; NCIPM
5. The most important sucking pests of cotton and rice are respectively
 - a) *Nilaparvata lugens* and *Aphis gossypii*
 - b) *Aphis gossypii* and *Thrips oryzae*
 - c) *Amrasca biguttula biguttula* and *Scirtothrips dorsalis*
 - d) *Thrips gossypii* and *Orseolia oryzae*
6. Which of the following microorganism causes fatal poisoning in canned fruits and vegetables?
 - a) *Aspergillus flavus*
 - b) *Penicillium digitatum*
 - c) *Clostridium botulinum*
 - d) *Rhizoctonia solani*
7. The cause of the great Bengal Famine was
 - a) Blast of rice
 - b) Brown spot of rice
 - c) Rust of wheat
 - d) Karnal bunt of wheat
8. Actinomycetes belong to
 - a) The fungi
 - b) Eukaryote
 - c) *Mycelia sterilia*
 - d) None of the above
9. A virus-free clone from a virus infected plant can be obtained by
 - a) Cotyledonary leaf culture
 - b) Axenic culture
 - c) Stem culture
 - d) Meristem tip culture
10. Which of the following is not an objective of the National Food Security Mission?
 - a) Sustainable increase in production of rice, wheat and pulses
 - b) Restoring soil fertility and productivity at individual farm level
 - c) Promoting use of bio-pesticides and organic fertilizers
 - d) Creation of employment opportunities

11. Agmarknet, a portal for the dissemination of agricultural marketing information, is a joint endeavour of
 - a) DMI and NIC
 - b) DMI and Ministry of Agriculture
 - c) NIC and Ministry of Agriculture
 - d) DMI and Directorate of Economics and Statistics
12. The share of agriculture and allied activities in India's GDP at constant prices in 2011-12 was
 - a) 14.1%
 - b) 14.7%
 - c) 15.6%
 - d) 17.0%
13. The average size of land holding in India according to Agricultural Census 2005-06 is
 - a) 0.38 ha
 - b) 1.23 ha
 - c) 1.49 ha
 - d) 1.70 ha
14. 'Farmers First' concept was proposed by
 - a) Paul Leagans
 - b) Neils Rolling
 - c) Robert Chamber
 - d) Indira Gandhi
15. In the year 2012, GM crops were cultivated in an area of
 - a) 150 million hectare in 18 countries
 - b) 170 million hectare in 28 countries
 - c) 200 million hectare in 18 countries
 - d) 1.70 million hectare in 28 countries
16. The broad-spectrum systematic herbicide glyphosate kills the weeds by inhibiting the biosynthesis of
 - a) Phenylalanine
 - b) Alanine
 - c) Glutamine
 - d) Cysteine
17. At harvest, the above ground straw (leaf, sheath and stem) weight and grain weight of paddy crop are 5.5 and 4.5 tonnes per hectare, respectively. What is the harvest index of paddy?
 - a) 45%
 - b) 50%
 - c) 55%
 - d) 100%
18. Crossing over between non-sister chromatids of homologous chromosomes takes place during
 - a) Leptotene
 - b) Pachytene
 - c) Diplotene
 - d) Zygotene
19. The term 'Heterosis' was coined by
 - a) G.H. Shull
 - b) W. Bateson
 - c) T.H. Morgan
 - d) E.M. East
20. When a transgenic plant is crossed with a non-transgenic, what would be the zygosity status of the F_1 plant?
 - a) Homozygous
 - b) Heterozygous
 - c) Hemizygous
 - d) Nullizygous
21. The highest per capita consumption of flowers in the world is in
 - a) The USA
 - b) India
 - c) Switzerland
 - d) The Netherlands
22. Which of the following is a very rich source of betalain pigment?
 - a) Radish
 - b) Beet root
 - c) Carrot
 - d) Red cabbage
23. Dog ridge is
 - a) Salt tolerant rootstocks of mango
 - b) Salt tolerant rootstocks of guava
 - c) Salt tolerant rootstocks of grape
 - d) Salt tolerant rootstocks of citrus
24. Which of the following micronutrients are most widely deficient in Indian soils?
 - a) Zinc and boron
 - b) Zinc and iron
 - c) Zinc and manganese
 - d) Zinc and copper
25. Which of the following fertilizers is not produced in India?
 - a) DAP
 - b) Urea
 - c) Muriate of potash
 - d) TSP
26. What is the estimated extent of salt affected soils in India?
 - a) 5.42 mha
 - b) 7.42 mha
 - c) 11.42 mha
 - d) 17.42 mha
27. Which of the following is not a feature of watershed?
 - a) Hydrological unit
 - b) Biophysical unit
 - c) Socio-economic unit
 - d) Production unit

28. Correlation coefficient 'r' lies between
 a) 0 and 1
 b) -1 and 1
 c) -1 and 0
 d) 0 and ∞
29. For the data 1, -2, 4, geometric mean is
 a) 2
 b) 4
 c) $-\frac{7}{3}$
 d) -2
30. The relationship between Arithmetic mean (A), Harmonic mean (H) and Geometric mean (G) is
 a) $G^2=AH$
 b) $G=\sqrt{A+H}$
 c) $H^2=GA$
 d) $A^2=GH$

PART – II (Subject Paper)

Multiple choice questions (No. 31 to 130). Choose the correct answer (a, b, c or d) and enter your choice in the circle (by shading with a pencil) on the OMR - answer sheet as per the instructions given on the answer sheet.

31. What is needed to assemble a logic network for adding three digits?
 a) OR gate
 b) AND and NOT gates
 c) Two half adders
 d) Both a) and c)
32. What is the decimal equivalent of binary number 111110?
 a) 2^6-1
 b) 2^6
 c) 2^6-2
 d) 2^6+2
33. What is the function of Control Unit in the Central Processing Unit?
 a) To perform logical operations
 b) To store program instructions
 c) To transfer data to primary storage
 d) To decode program instructions
34. The index register in a digital computer is used for
 a) Address modification
 b) Indirect addressing
 c) Keeping track of number of times a loop is executed
 d) Pointing to stack address
35. Which of the following statements is correct?
 a) Base class pointer can not point to derived class
 b) Pointer to base class can not be created
 c) Pointer to derived class can not be created
 d) Derived class pointer can not point to base class
36. Which of the following concept means determining at runtime what method to invoke?
 a) Data hiding
 b) Dynamic binding
 c) Dynamic typing
 d) Dynamic loading
37. Which of the following is not member of the class?
 a) Static function
 b) Friend function
 c) Constant function
 d) Virtual function
38. Which of the following are available only in the class of hierarchy chain?
 a) Public data members
 b) Private data members
 c) Protected data members
 d) Member functions
39. The parameter list in function overloading must differ by
 a) Number of arguments
 b) Number or data type of arguments
 c) Function name
 d) Function size
40. Link URL in HTML is specified using _____ attribute.
 a) src
 b) href
 c) link
 d) rel
41. Default attribute value of "target" is _____ in HTML.
 a) _blank
 b) _self
 c) _parent
 d) _top
42. The complete graph K has _____ different spanning trees.
 a) n^{n-2}
 b) $n \times n$
 c) n^n
 d) n^2

43. A graph G is called a _____ if it is a connected acyclic graph?
- Cyclic graph
 - Regular graph
 - Tree
 - Mixed graph
44. Use of Queue can be the efficient way to implement?
- Quick sort
 - Radix sort
 - Depth first search
 - Recursion
45. The complexity of Binary search algorithm is
- n
 - $n \log_e n$
 - $\log_e n$
 - n^2
46. The average successful search time for sequential search on 'n' items is
- $n/2$
 - $(n-1)/2$
 - $\log(n)+1$
 - $(n+2)/2$
47. The largest percentage of total life cost of software is
- design cost
 - coding cost
 - testing cost
 - maintenance cost
48. Software configuration management involves identifying the configuration of the software
- at the end of the life cycle only
 - at the beginning of the lifecycle only
 - at the predefined points of time during the life cycle
 - prior to the beginning of the life cycle
49. Which of the following is a protocol used to route an email message through the internet?
- TCP/IP
 - SMTP
 - HTML
 - HTTP
50. What is the default subnet mask for class C network?
- 127.0.0.1
 - 255.0.0.0
 - 255.255.255.0
 - 255.255.0.0
51. Which of the following TCP/IP protocol allows an application program on one machine to send a datagram to an application on another?
- X.25
 - UDP
 - VMTP
 - SMTP
52. Which of the following field contains the address of the router?
- TCP address
 - IP address
 - Default gateway
 - Subnet mask
53. An error- detecting code inserted as a field in a block of data to be transmitted is known as
- frame check sequence
 - error detecting code
 - flow control
 - checksum
54. In OSI model, which of the following layer provides error-free delivery of data?
- Transport
 - Data link
 - Session
 - Network
55. Error detection at a data link level is achieved by
- bit stuffing
 - hamming codes
 - equalization
 - cyclic redundancy codes
56. What is the error in the following code:
- ```

Class t
{
 virtual void print();
}

```
- No error
  - Function print() should be declared as static
  - Function print() should be defined
  - Class t should contain data numbers
57. Which of the following is the most powerful parsing method?
- SLR
  - LALR
  - LL(1)
  - Canonical LR
58. Regular expressions are used for defining
- syntax
  - ambiguity
  - tokens
  - code optimization

59. Type checking is normally done during
- lexical analysis
  - syntax directed translation
  - syntax analysis
  - code optimization
60. Ambiguity of a grammar can be removed by
- defining the syntax rules
  - looking at associating and precedence
  - looking at the DFA rules
  - all of the above
61. FIRST and FOLLOW are used in which of the following?
- Lexical analysis
  - Shift reducing parsing
  - Regular expression
  - Predictive parsing
62. Handle pruning is used in which of the following parsers?
- Predictive parsers
  - Shift reduce parsers
  - Operator precedence parsers
  - Simple precedence parsers
63. Resolution of externally defined symbols is performed by
- linker
  - loader
  - compiler
  - interpreter
64. To avoid race condition, the number of processes that may be simultaneously inside their critical section is
- 0
  - 1
  - 2
  - 4
65. Thrashing
- is a neutral consequence of virtual memory systems
  - always occurs on large computers
  - can be caused by paging algorithms
  - can always be avoided by swapping
66. Switching the CPU to another process requires to save state of old process and loading new process state is called
- process blocking
  - context switch
  - time sharing
  - caching
67. A thread
- is a lightweight process where the context switching is high
  - is used to speed up paging
  - cannot execute independently
  - is a lightweight process where the context switching is low
68. The problem of fragmentation arises in
- static storage allocation
  - heap allocation
  - stack allocation with dynamic binding
  - stack allocation storage
69. The commonly used directory implementation in most operating systems is
- single level directory structure
  - two level directory structure
  - tree directory structure
  - a cyclic directory structure
70. Which of the following is not a logical data structure?
- Tree
  - Network
  - Chain
  - Relational
71. What type of relationship is expressed with the phrase "students take classes"?
- 1:M
  - 1:1
  - M:1
  - M:N
72. A transitive dependency is which of the following?
- A functional dependency between two or more key attributes
  - A functional dependency between two or more non-key attributes
  - A relation that is in first normal form
  - A relation that is in second normal form
73. If a table has been normalized so that all the determinants are candidate keys, then that table is in
- 1NF
  - 2NF
  - 3NF
  - BCNF
74. The HAVING clause does which of the following?
- Acts like WHERE clause but is used for columns rather than groups
  - Acts like a WHERE clause but is used for groups rather than rows
  - Acts alike a WHERE clause but is used for rows rather than columns
  - Acts EXACTLY like WHERE clause

75. In Newton-Raphson method to find a root of a given linear equation, which of the following is true?
- Only one point  $X_0$  determines the interactions
  - Two points  $X_0$  and  $X_1$  are needed to start the interactions
  - Converges slowly than Secant's method
  - Evaluation of  $f'(x)$  is not essential
76. A student discovers that his/her grade on a recent test was 72<sup>nd</sup> percentile. If 90 students wrote the test, then approximately how many students received a higher grade than he/she did?
- 25
  - 65
  - 71
  - 72
77. A scientist is weighing each of 30 fish. She obtains a mean of 300 g and a standard deviation of 20 g. After completing the weighing, she finds that the scale was misaligned, and always under reported every weight by 20 g, i.e., a fish that really weighed 260 g was reported to weight 240 g. What is the mean and standard deviation after correcting for error in the scale?
- 280 g, 20 g
  - 300 g, 40 g
  - 320 g, 20 g
  - 320 g, 40 g
78. The frequency distribution of amount of rainfall in December in a certain region for a period of 30 years is given below:
- | Rainfall<br>(in cm) | Number of years |
|---------------------|-----------------|
| 5.0 - 10.0          | 3               |
| 10.0 - 15.0         | 6               |
| 15.0 - 20.0         | 8               |
| 20.0 - 25.0         | 8               |
| 25.0 - 30.0         | 5               |
- The mean amount of rainfall in cm is
- 18.25
  - 18.35
  - 18.50
  - 18.75
79. How many records are specified in the SELECT clause?
- 0
  - 1
  - 2
  - 3
80. What does IDE stand for?
- Integrated Development Environment
  - Integrated Design Environment
  - Interior Development Environment
  - Interior Design Environment
81. Which is not a common control event?
- Click
  - Single Click
  - Double Click
  - Mouse Down
82. Which is not an integer data type?
- Single
  - Byte
  - Short
  - Long
83. Which sequence of char data types is listed from lowest to highest?
- a, z, A, Z
  - A, a, Z, z
  - A, Z, a, z
  - z, a, Z, A
84. The proper operator precedence, from first to last, is
- logical, comparison, and arithmetic
  - arithmetic, comparison, and logical
  - arithmetic, logical, and comparison
  - comparison, arithmetic, and logical
85. Which selection process is an example of multiple branches from a single expression?
- If...Then
  - Select Case
  - Do...Loop
  - For...Next
86. What happens in a Select Case construct when a test value matches the test expression?
- The corresponding block of statements is run
  - The next Case test value is checked
  - The Case Else statement is run
  - The Select Case construct is exited
87. From how many places in the code can a procedure/function be called?
- 0
  - 1
  - 2
  - As many times as needed
88. The scope of a variable refers to
- the lifetime of the variable
  - the name of the variable
  - the accessibility of the variable
  - the datatype of the variable
89. Which is not a valid type of JOIN?
- LEFT JOIN
  - MIDDLE JOIN
  - RIGHT JOIN
  - INNER JOIN

90. In a three-tier web architecture, which layer is exemplified by a web server?
- Application
  - Association
  - Data
  - Logical
91. How will using a middle tier typically affect the number of connections to a database?
- Increase the number
  - Have no effect on the number
  - Decrease the number
  - It depends on the type of client
92. The stateless HTTP protocol refers to web pages created
- on a web server
  - without information from a database
  - without knowledge of previous web pages
  - before a request from a client
93. Where do cookies store information?
- HTML source
  - Text file
  - URL
  - Both a) and b)
94. Where does the query string store information?
- HTML source
  - Text file
  - URL
  - Both a) and b)
95. Methods are used to represent
- actions
  - classes
  - data
  - events
96. Encapsulation makes it easier to
- reuse and modify existing modules of code
  - write and read code by sharing method names
  - hide and protect data from external code
  - both a) and b)
97. Dijkstra banking algorithm in an operating system, solves the problem of
- deadlock avoidance
  - deadlock recovery
  - mutual exclusion
  - context switching
98. The operating system that reads and reacts in terms of actual time is
- batch system
  - quick response system
  - real time system
  - time sharing system
99. Dirty bit is used to show
- page with corrupted data
  - wrong page in the memory
  - page that is modified after being loaded into cache memory
  - page that is less frequently accessed
100. What is a shell in Unix?
- It is a hardware component
  - It is a command interpreter
  - It is a part in compiler
  - It is a tool in CPU scheduling
101. A subschema expresses
- the logical view
  - the physical view
  - the external view
  - all of the above
102. In a hierarchical model records are organized as
- graph
  - list
  - links
  - tree
103. What is Granularity?
- The size of database
  - The size of data item
  - The size of record
  - The size of file
104. NULL is
- the same as 0 for integer
  - the same as blank for character
  - the same as 0 for integer and blank for character
  - not a value
105. The database administration function includes
- application programming
  - computer operations management
  - database access planning
  - all of the above
106. An advantage of the database management approach is
- data is dependent on programs
  - data redundancy increases
  - data is integrated and can be accessed by multiple programs
  - none of the above
107. In E-R Diagram relationship type is represented by
- ellipse
  - dashed ellipse
  - rectangle
  - diamond

108. By means of a data flow diagram, the analyst can detect
- task duplication
  - unnecessary delays
  - task overlapping
  - all of the above
109. Indicate which of the following is not true about interpreter?
- Interpreter generates an object program from the source program
  - Interpreter analyses each source statement every time it is to be executed
  - Interpreter is a kind of translator
  - All of the above
110. Functions of Lexical analyzer are
- Removing white space
  - Removing constants, identifiers and keywords
  - Removing comments
  - All of the above
111. Bottom up parsing involves
- shift reduce
  - handle pruning
  - operator check
  - both a) and b)
112. Which is not a software life cycle model?
- Spiral Model
  - Waterfall Model
  - Prototyping Model
  - Capability maturity Model
113. Project risk factor is considered in
- Spiral Model
  - Waterfall Model
  - Prototyping Model
  - Iterative enhancement Model
114. SDLC stands for
- software design life cycle
  - software development life cycle
  - system design life cycle
  - system development life cycle
115. Waterfall model is not suitable for
- small Projects
  - complex Projects
  - accommodating change
  - large projects
116. Design phase includes
- data, architectural and procedural design only
  - architectural, procedural and interface design only
  - data, architectural and interface design only
  - data, architectural, interface and procedural design
117. Which is a black box testing method?
- Boundary value analysis
  - Basic path testing
  - Code path analysis
  - Batch path analysis
118. A key concept of quality control is that all work products
- are delivered on time and under budget
  - have complete documentation
  - have measurable specification for process outputs
  - are thoroughly tested before delivery to the customer
119. Coupling and cohesion can be represented using a
- cause-effect graph
  - dependence matrix
  - structure chart
  - SRS
120. Two main measures for the efficiency of an algorithm are
- processor and memory
  - complexity and capacity
  - time and space
  - data and space
121. The time factor when determining the efficiency of algorithm is measured by
- counting microseconds
  - counting the number of key operations
  - counting the number of statements
  - counting the kilobytes of algorithm
122. The Worst case occur in linear search algorithm when
- item is somewhere in the middle of the array
  - item is not in the array at all
  - item is the last element in the array
  - item is the last element in the array or is not there at all
123. The complexity of Binary search algorithm is
- $O(n)$
  - $O(\log n)$
  - $O(n^2)$
  - $O(n \log n)$
124. The complexity of merge sort algorithm is
- $O(n)$
  - $O(\log n)$
  - $O(n^2)$
  - $O(n \log n)$



125. Which of the following data structure is linear data structure?
- Trees
  - Graphs
  - Arrays
  - None of the above
126. The operation of processing each element in the linked list is known as
- sorting
  - merging
  - inserting
  - traversal
127. How many constructors can a class have?
- 0
  - 1
  - 2
  - All of the above
128. A constructor is a special type of
- class
  - field
  - method
  - property
129. An Exception is another name for a
- compile error
  - logic error
  - runtime error
  - syntax error
130. What is required to reference an element in an array?
- Array name
  - Index value of the element
  - Element value
  - Both a) and b)

**Matching type questions (No. 131 to 140); all questions carry equal marks. Choose the correct answer (a, b, c, d or e) for each sub-question (i, ii, iii, iv and v) and enter your choice in the circle (by shading with a pencil) on the OMR - answer sheet as per the instructions given on the answer sheet.**

131. Match the ASCII code for the following characters

- |        |             |
|--------|-------------|
| i) F   | a) 01001010 |
| ii) H  | b) 01001000 |
| iii) L | c) 01001110 |
| iv) N  | d) 01000110 |
| v) J   | e) 01001100 |

132. Match the following terms to their definition

- |             |                                                                       |
|-------------|-----------------------------------------------------------------------|
| i) Spam     | a) Software that collects information about computer usage            |
| ii) Cookies | b) Often display in the form of pop-ups                               |
| iii) Adware | c) Software that has a malicious intent, like a virus or worm         |
| iv) Spyware | d) Small text files stored on your computer to track your site visits |
| v) Malware  | e) Unwanted or junk email                                             |

133. Match the following terms to their definition

- |                         |                                                                |
|-------------------------|----------------------------------------------------------------|
| i) Wizards              | a) Forms that provide structure for a document                 |
| ii) Templates           | b) A series of commands grouped into a single command          |
| iii) Macro              | c) A single program that incorporates most commonly used tools |
| iv) Integrated software | d) Step-by-step guides in application software                 |
| v) Software suite       | e) Bundled group of software programs                          |

134. Match the following addressing modes to the respective commands

- |                               |                    |
|-------------------------------|--------------------|
| i) Register Addressing Mode   | a) ADD R1, (1001)  |
| ii) Immediate Addressing Mode | b) ADD R1,R2       |
| iii) Indexed Addressing Mode  | c) ADD R2,100 (R1) |
| iv) Displacement Address Mode | d) ADD R1,#3       |
| v) Direct Addressing Mode     | e) ADD R3, (R1+R2) |

135. Match the following normalization forms to the concepts used in them

- |                         |                               |
|-------------------------|-------------------------------|
| i) BCNF                 | a) Atomic values              |
| ii) First Normal Form   | b) Full Functional Dependency |
| iii) Second Normal Form | c) Determinant                |
| iv) Third Normal Form   | d) Multi valued Dependency    |
| v) Fourth Normal Form   | e) Transitive Dependency      |

136. Match the grep command switches to their functionality

- |              |                                                          |
|--------------|----------------------------------------------------------|
| i) grep -c   | a) Case sensitivity ignored                              |
| ii) grep -n  | b) Displays all the lines that do not match              |
| iii) grep -v | c) Display the number of matched lines                   |
| iv) grep -w  | d) Display the number of matched lines with line numbers |
| v) grep -i   | e) Match Whole Word                                      |

137. Match the following technologies to their OEM companies

- |              |                       |
|--------------|-----------------------|
| i) Java      | a) AT&T,Bell Labs     |
| ii) Axis 2.0 | b) Sun Microsystems   |
| iii) C#      | c) Apache             |
| iv) 11g      | d) Microsoft          |
| v) unix      | e) Oracle Corporation |

138. Match the following operators to their types

- |        |                        |
|--------|------------------------|
| i) %   | a) Logical Operator    |
| ii) && | b) Left shift Operator |
| iii) & | c) Modulus Operator    |
| iv) << | d) Member Operator     |
| v) →   | e) Reference Operator  |

139. Match the following protocols to the respective TCP/IP layer

- |              |                      |
|--------------|----------------------|
| i) ICMP      | a) Physical layer    |
| ii) ETHERNET | b) Transport layer   |
| iii) UDP     | c) Network layer     |
| iv) DHCP     | d) Data Link layer   |
| v) ARP       | e) Application layer |

140.

- |                         |                                                                                      |
|-------------------------|--------------------------------------------------------------------------------------|
| i) Open source software | a) one selects which software features to install                                    |
| ii) Shareware           | b) software that is free if changes you make to the source code are distributed free |
| iii) Freeware           | c) software still under development                                                  |
| iv) Beta version        | d) software that is free to use                                                      |
| v) Custom installation  | e) software that is distributed free with certain condition                          |

**Short questions (No. 141 to 146); each question carries FIVE marks. Write answers, including computation / mathematical calculations if any, in the space provided for each question on the question paper itself.**

141. There were 8, 15, 13 and 14 nodes in 4 different trees. Which of them could have formed a full binary tree? Explain briefly.

142. Explain Deadlock prevention, Avoidance and Detection.

143. Explain Functional dependency and Full functional dependency with examples.

144. Define three basic principal of design of experiments. Explain with the help of examples.

145. What is IPV6? What are its advantages over IPV4?

146. Sort 20,35,40,100,3,10,15 using insertion sort. Describe step by step.