



UNIVERSITY OF CALICUT

Entrance Examination for Admission to MSc(Computer Science)

No: of Questions :100

Duration of Exam: Two hours

Instructions to Candidates

Mark your answers in the separate answer sheet provided. Candidates have to choose the best suited option from the available four options. Put a 'X' mark for your choice in the answer sheet using a pen. Each correct answer carries 1 mark and wrong answer carries -ve 0.25 marks. Multiple choices marked as answers for a question will be treated as wrong answer. Roughwork, if any, has to be done only in the space provided for it in the question booklet. No: of questions attempted(including corrected choices) and No: of corrections should be indicated in the answer sheet in the space provided for it.

SECTION I

1. In which of the following page replacement policies, Belady's anomaly may occur?
a) LRU b) FIFO c) Optimal d) MRU
2. Dirty bit is used to show the
a) page with corrupted data b) page that less frequently accessed
c) wrong page in memory d) page that is modified after being loaded into cache memory
3. A good software design must have
a) High module coupling, High module cohesion
b) High module coupling, low module cohesion
c) Low module coupling, Low module cohesion
d) Low module coupling, High module cohesion

4. Cyclomatic complexity is given by $v(G) = \dots\dots\dots$. Where E = the number of edges of the graph and N = the number of nodes of the graph.
 a) $E-N-2$ b) $E-N+2$ c) $E+N-2$ d) $E+N+2$
5. A Bottom up parser generates
 a) Left Most Derivation b) Left Most Derivation in Reverse
 c) Right Most Derivation d) Right Most Derivation in Reverse
6. Which of the following is not an intermediate form with respect to compilation
 a) Postfix notation b) 3 Address code
 c) Quadruples d) Syntax tree
7. Join-dependency plays an important role in
 a) 2NF b) 4NF c) 3NF d) 5NF
8. Suppose a binary tree is constructed with n nodes, such that each node has exactly either zero or two children. The maximum height of the tree will be?
 a) $(n+1)/2$ b) $(n-1)/2$ c) $\frac{n}{2} - 1$ d) None of these
9. The height of a BST is given as h . Consider the height of the tree as the no. of edges in the longest path from root to the leaf. The maximum no. of nodes possible in the tree is?
 a) $2^{h-1} - 1$ b) $2^{h+1} - 1$ c) $2^{h-1} + 1$ d) None of these
10. What is the postfix expression of $3 * [(p - n) + 5 * (s - t)]$?
 a) $3pn - 5 s t - * + *$ b) $* 3 - p n + * 5 - s t$
 c) $p - n + s - t * 5 * 3$ d) None of these
11. Moving process from main memory to disk is called
 a) Caching b) Termination c) Swapping d) Booting
12. Average time complexity of Merge sort algorithm is
 a) $O(n)$ b) $O(n^2)$ c) $O(n \log n)$ d) $O(1)$
13. The column of a table in relational model is
 a) tuple b) attribute c) entity d) degree
14. Which of the following statements is correct?
 a) A candidate key in a relational model can accept duplicate values
 b) A Super key in relational model is same as candidate key.
 c) The primary key of a weak entity set in ER Model is formed by Combining the primary key of the strong entity set on which the weak entity set is existence dependent and the weak entity set's discriminator.
 d) A primay key in a relational model can accept null values
15. Which of the following is known as a minimal super key?
 a) Foreign key b) Primary Key c) Null Value d) None of the above

16. Which of the following is a true statement?
- The main difference between hub and switch is in the method in which data frames are being delivered.
 - A switch keeps a record of the MAC addresses all devices connected to it.
 - A router is typically connected to at least two networks, commonly two Local Area Networks or Wide Area Networks or a LAN and its ISP's network.
 - All of the above
17. The data unit in the TCP/IP application layer is called a-----
- Message
 - segment
 - datagram
 - frame
18. Encryption and decryption are functions of the -----layer of OSI model:
- Transport
 - Session
 - Application
 - Presentation
19. RAD in software development methodology stands for-----
- Rapid Analysis Design
 - Raid Aided Development
 - Rapid Application Development
 - Redundant Application Design
20. The relationship of data elements in a module is called
- Coupling
 - Modularity
 - Cohesion
 - Granularity
21. Which one is a software engineering layer in the layered approach?
- Process
 - Method
 - Tools
 - All of these
22. Fuchsia is the codename of the capability-based, real-time operating system, not based on linux, currently being developed by
- Android
 - IBM
 - Google
 - Microsoft
23. Which of the following binary number is the same as its 2's complement:
- 1010
 - 0101
 - 1000
 - 1001
24. Among the logic families RTL, TTL, ECL and CMOS, the fastest is:
- ECL
 - CMOS
 - TTL
 - RTL
25. 'new' is an operator in ...
- C
 - COBOL
 - PASCAL
 - Java
26. What will the following C program will output?
- ```
main()
{ int arr[2]={0,1};
 printf("%d", arr[2]);}
```
- 1
  - 0
  - error message
  - some garbage value
27. The keyword *final* in java is associated with

- a) exception handling
- b) defining variable, method or class
- c) to mark the end of the program
- d) to indicate comment lines

28. Who is the father of information theory?

- a. Charles Babbage
- b. Alan Turing
- c. Claude Elwood Shannon
- d. Von Neumann

29. Which of the following is NOT an open source software :

- a. Ubuntu
- b. Libre office
- c. Matlab
- d. Eclipse

30. Which of the following cryptographic algorithms is proven to be UNBREAKABLE:

- a. One-Time Pad
- b. RSA
- c. Diffie-Hellman key exchange
- d. DES

31. What will be the output of the following C program?

```
main()
{ int i=3, j=5;
 if(i-j) printf("printing – if.. %d..", i-j);
 printf(" program ended");}
```

- a) printing – if..-2.. program ended
- b) Compiler error
- c) program ended
- d) None of these

32. Gmail is an example for the use of .....

- a. IaaS
- b. Paas
- c. SaaS
- d. none of the above

33. Number of posts, no: of downloads, no: of likes etc are metrics for -

- a. Sentiment analysis
- b. Web analytics
- c. Social analytics
- d. None of the above

34. Which statement with respect to Android is true?

- a) Android is primarily composed of C, C++ and Java
- b) Android is never released under open source license.
- c) Android is not related to Google
- d) Android is not based on Linux kernel

35. The time complexity of linear search is ----- in best case, ----- in average case and ----- in worst case.

- a)  $O(n)$ ,  $O(1)$ ,  $O(n)$
- b)  $O(1)$ ,  $O(n)$ ,  $O(n)$
- c)  $O(n)$ ,  $O(n)$ ,  $O(n)$
- d)  $O(n)$ ,  $O(n)$ ,  $O(n^2)$

36. JIT compilation is related to

- a) COBOL
- b) C++
- c) C
- d) Java

37. ----- corresponds to Von Neumann Architecture

- a) MISD
- b) SISD
- c) SIMD
- d) MIMD

38. Applying ....., documents are loaded into a buffer and then the printer pulls them off the buffer at its own rate.

- a) swapping      b) spooling      c) debugging      d) caching

39. Which is a valid keyword in C?

- a) MAIN      b) register      c) jump      d) string

40. Starvation is a problem closely related to

- a) Database security      b) Processes and operating systems  
c) Designing user friendly GUI      d) Storage efficiency of disk

41. Which is a scripting language?

- a) Python      b) PHP      c) Perl      d) All of these

42. What is the output the following C program?

```
main()
{int i=0;
 i++;
 printf("%d ", i++); }
```

- a) 2      b) 1      c) Compiler Error      d) None of these

43. The term SCRUM is related to

- a) agile development of software      b) debugging technique  
c) computer language compiler      d) Latest type of LED screen developed

44. Which is the SQL statement to enable the checking of a given condition for the value being entered into a record?

- a) The CHECK constraint      b) INSERT INTO  
c) WHERE      d) GROUP BY

45. What is the output the following C program?

```
main()
{int i=66;
 printf("%c %d", i, i); }
```

- a) b,66      b) Error message      c) B,66      d) 66,66

46. The basic three Vs of Big Data are \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_.

- a) Volume, Verify, Validate      b) Volume, Velocity, Variety  
c) Viscosity, Value, Validity      d) View, Viability, Vitality

47. What is the output of the following program in java?

```
class Test{
 static{System.out.print("static block is starting..");}
```

```
public static void main(String args[]){
 System.out.print("Hello main"); } }
```

- a) Hello main static block is starting.. b) static block is starting..Hello main
  - c) Error message d) Hello main
48. In OOP, ..... is a blueprint or template from which ..... are created.
- a) file, variables b) object, classes c) class, objects d) string, alphabets
49. Which of the following statements is true?
- a) Deepspace is related to distributed computing
  - b) Ruby is a procedural computer language
  - c) CORBA is related to platform independent distributed computing
  - d) COBOL is a language very much suited for web application development.
50. Which is an example for opensource database?
- a) PostgreSQL b) MySQL c) MongoDB d) All of the above

## SECTION II

51. For the XOR gate, what is the output when both inputs are HIGH:
- a)HIGH b)LOW c) Average of HIGH and LOW d)None of these
52. Simplify the expression  $(AB+C)(AB+D)$ .
- a)  $AD+CB$  b)  $AB+CD$  c)  $AC+BD$  d)  $AC+BD$
- 53.Gray code equivalent of binary number 1010
- a)1110 b)1101 c)1111 d)1000
- 54.8085 is ---- microprocessor and 8086 is a ----- microprocessor
- a)8 bit, 16 bit b)16 bit, 32 bit c) 8 bit, 8 bit d)32 bit, 64 bit
- 55.In 8086, if the current values in the code segment register and the instruction pointer are 0200h and 01ACh, respectively, what physical address is used in the next instruction fetch?
- a)021ACh b)03AC0h c)021ADh d)03AC1h
- 56.A transistor working as an amplifier is in ----- region
- a)Active b)Passive c)Cut-off d)Saturation
57. Zener diode is used for
- a)VoltageRegulation b) VoltageAmplification c) VoltageInverting d) None of these
58. When a PN junction is forward biased in a Germanium diode, the cut in voltage is



69. The slope on the road surface generally provided on the curves is known as

- a) Angle of friction b) Angle of repose c) Angle of banking d) Angle of elevation

70. In order to keep a body moving in a circle, there exists a force on it that is directed toward centre of circle. This force is known as

- a) centrifugal force b) centripetal force c) gravitational force d) magnetic force

### SECTION IV

71. If A is any square matrix, then the matrix  $B = \frac{A+A^T}{2}$  is:

- a) the inverse of A  
b) a symmetric matrix  
c) a skew-symmetric matrix  
d) not a symmetric matrix

72. Which of the following is not a correct statement?

- a)  $\lim_{\theta \rightarrow 0} \frac{\sin \theta}{\theta} = 1$   
b)  $\lim_{n \rightarrow \infty} x^n = 0, 0 < x \leq 1$   
c)  $\lim_{\theta \rightarrow 0} \frac{1-\theta^2}{1+\theta} = 1$   
d) All the statements are correct

73. If  $y = a^x$ ,  $\frac{dy}{dx}$  is

- a)  $x a^{x-1}$   
b)  $a x^{a-1}$   
c)  $(\log a) a^x$   
d) none of the above

74. If matrix  $B = \begin{pmatrix} 1 & 2 & 3 \\ 3 & 2 & 1 \\ 2 & 4 & 6 \end{pmatrix}$  which of the following statement is always correct w.r.t B?

- a) rank(B) = 3  
b) B is invertible  
c) rank(B) = 2  
d) none of the above statements are correct

75. Let  $f(x) = \begin{cases} 0 & \text{if } x \text{ is irrational} \\ 1 & \text{if } x \text{ is rational} \end{cases}$ , then which of the following is true with respect to f

- a) f is continuous function  
b) f is Riemann integrable  
c) f is not Riemann integrable  
d) None of the statements are correct

76. For a sequence  $\{A_i\}$  of open sets, which of the following is true?

- a)  $\bigcup_{i=1}^{\infty} A_i$  is an open set  
b)  $\bigcap_{i=1}^{\infty} A_i$  is always open

- c)  $\bigcap_{i=1}^{\infty} A_i^c$  is not a closed set                      d) none of the above is true

77. Which of the following is a convergent series?

- a)  $\sum \frac{1}{n}$     b)  $\sum \frac{1}{n^2}$             c)  $\sum \frac{1}{\sqrt{n}}$             d) None of the above

78. Which of the following statement is not true?

- a) If  $f$  is a continuous real valued function on  $\mathbb{R}$ , then  $f^{-1}$  of an open interval is an open interval.  
b) If  $f$  is a monotone real valued function, then  $f^{-1}$  always exists.  
c) Every continuous real valued function is differentiable in  $\mathbb{R}$ .  
d) Every differentiable real valued function is continuous.

79. Which of the following statement is NOT true, if  $Q$  is the set of rationals?

- a) The set  $Q^c$ , the set of irrational numbers in  $\mathbb{R}$  is dense in  $\mathbb{R}$ .  
b) For any  $I \subseteq \mathbb{R}$ ,  $Q \cap I$  is a countable subset of  $\mathbb{R}$ .  
c) For any  $I \subseteq \mathbb{R}$ ,  $Q \cap I$  is an uncountable subset of  $\mathbb{R}$ .  
d)  $Q$ , the set of rational numbers in  $\mathbb{R}$  is a dense set in  $\mathbb{R}$ .

80. Which of the following is an equivalence relation

- a) 'a is related to b', if a divisible by b.  
b) 'a is related to b', if a and b are of same sign.  
c) Similarity of triangles in the class of all triangles  
d) Two lines are related to each other if they are parallel.

## SECTION V

81. If  $X \sim B(1, \theta)$ , the distribution of  $Y = 1 - X$  is

- a)  $B(1, 1 - \theta)$             b)  $B(1, \theta)$             c)  $B(2, \theta)$             d) None of the above

82. If  $A$  and  $B$  are independent events which of the following statement is not correct

- a)  $P(AB) = P(A) P(B)$                       b)  $P(AB^c) = P(A) (1 - P(B))$   
 c)  $P(A^c B^c) = (1 - P(A)) (1 - P(B))$     d) None of the above statements are correct

83. If  $T_1$  and  $T_2$  are two unbiased estimators of a parameter  $\theta$ , then

- a)  $T_1 + T_2$  is unbiased for  $\theta$                                               b)  $\alpha T_1 + \beta T_2$  for  $\alpha, \beta \in (0, 1)$  and  $\alpha + \beta = 1$   
 c) Both  $T_1$  and  $T_2$  are consistent estimators of  $\theta$               d)  $T_1 + 2T_2$  is unbiased for  $\theta$

84. The pdf of a random variable  $X$  is  $f(x) = \frac{1}{2}$ ,  $0 < x < 2$ , then the variance of  $X$  is

- a)  $\frac{1}{2}$                       b) 2                      c)  $\frac{1}{3}$                       d) None of these

85. if  $f(x) = c e^{-\theta x}$ ,  $x > 0$ ,  $\theta > 0$ , is a pdf, then the value of  $c$  is:

- a) 1                      b)  $\theta$                       c) 2                      d) None of these

86. Which of the following is not a property of normal distribution?

- a) It is a symmetric distribution  
 b) It's mean and variance are equal  
 c) It's mean and median are equal  
 d) It's mean and mode are equal.

87. Which of the following is a correct statement?

- a) An unbiased estimator is always consistent.  
 b) A consistent estimator is always unbiased.  
 c) If  $T$  is a consistent estimator of  $\theta$ ,  $T^2$  is a consistent estimator of  $\theta^2$ .  
 d) None of the above statements are correct

88. If  $X$  and  $Y$  are independent standard normal random variables, then

- a)  $\frac{X}{Y}$  is a Chi-square variate  
 b)  $X^2 + Y^2$  is a Chi-square variate  
 c)  $X^2 / Y^2$  is a student's t-variate.

d)  $\frac{X}{Y}$  is a Snedecor's F-variate

89. Three coins are thrown simultaneously. What is the probability that all coins show the same face?

- a)  $\frac{1}{8}$     b)  $\frac{3}{8}$     c)  $\frac{1}{4}$     d) None of these

90. If the correlation between X and Y is  $\frac{1}{2}$ , then the correlation between aX and bY for

a, b  $\in \mathbb{R}$  is

- a)  $\frac{1}{2}$     b) 0    c) 1    d) None of these

## SECTION VI

91. The metal used as a catalyst for hydrogenation of oil is

- a) Nickel    b) Copper    c) Platinum    d) Silver

92. Which of the following is most electronegative

- a) Sodium    b) Calcium    c) Nitrogen    d) Oxygen

93. The most abundant 'rare gas' in earth is

- a) Helium    b) Argon    c) Xenon    d) Neon

94. The metal that was first used by early humans for making tools and weapons

- a) Gold    b) Silver    c) Copper    d) Iron

95. The monomer of polythene is

- a) Vinyl chloride    b) Vinyl alcohol    c) Ethylene    d) Propene

96. The most important criterion for spontaneity of a reaction is

( G= Gibbs free energy; S=Entropy )

- a)  $\Delta G$  negative    b)  $\Delta S$  negative    c)  $\Delta G$  positive    d) None of these

97. Milk is a ..... colloidal system.

- a) water in oil    b) solid in water    c) oil in water    d) liquid in solid

98. The work done when two moles of an ideal gas expands from an initial volume of one  $\text{dm}^3$  to vacuum at  $27^\circ\text{C}$  is

- a) 24.94 J/mol    b) zero    c) 49.88 J/mol    d) None of these

99. The Franck-Condon principle is related to

- a) Vibrational spectra    b) Electronic spectra    c) Rotational spectra    d) Raman spectra

**100.** Energy content in one mole of photons of radiation is

(  $h$ =planck's constant;  $\nu$  = frequency of photon;  $N$ =Avogadro's constant;  
 $m$ =mass of photon; )

- a)**  $h\nu$       **b)**  $Nh\nu$       **c)**  $\frac{1}{2} m(\text{velocity}^2)$       **d)** None of these