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(Pages : 16)

Name.....

Reg. No.....

**CALICUT UNIVERSITY CENTRALIZED ENTRANCE TEST (CU-CET)
APRIL 2025**

MASTER OF COMPUTER APPLICATION (MCA)

Time : Two Hours

Maximum : 400 Marks

Each question carries 4 marks.

1 mark will be deducted for each wrong answer.

1. Which of the following computer networks is built on the top of another network ?
 - (a) Overlay network.
 - (b) Prime network.
 - (c) Prior network.
 - (d) Chief network.
2. When a collection of various computers appears as a single coherent system to its clients, what is this called ?
 - (a) Mail system.
 - (b) Networking system.
 - (c) computer network.
 - (d) distributed system.
3. What are nodes in a computer network ?
 - (a) The computer that routes the data.
 - (b) The computer that terminates the data.
 - (c) The computer that originates the data.
 - (d) All of the mentioned.
4. Which one of the following is not a function of network layer ?
 - (a) Congestion control.
 - (b) Error control.
 - (c) Routing.
 - (d) Inter-networking.
5. What is the term for an endpoint of an inter-process communication flow across a computer network ?
 - (a) Port.
 - (b) Machine.
 - (c) Socket.
 - (d) Pipe.

Turn over

6. Which of the following is false in the case of a spanning tree of a graph G ?
- (a) It is tree that spans G .
 - (b) It is a subgraph of the G .
 - (c) It includes every vertex of the G .
 - (d) It can be either cyclic or acyclic.
7. Consider a undirected graph G with vertices $\{A, B, C, D, E\}$. In graph G , every edge has distinct weight. Edge CD is edge with minimum weight and edge AB is edge with maximum weight. Then, which of the following is false ?
- (a) Every minimum spanning tree of G must contain CD .
 - (b) If AB is in a minimum spanning tree, then its removal must disconnect G .
 - (c) No minimum spanning tree contains AB .
 - (d) G has a unique minimum spanning tree.
8. What is the worst case time complexity of the Quick sort ?
- (a) $O(n \log n)$.
 - (b) $O(n)$.
 - (c) $O(n^3)$.
 - (d) $O(n^2)$.
9. Which of the following sorting algorithm is best suited if the elements are already sorted ?
- (a) Heap Sort.
 - (b) Quick Sort.
 - (c) Insertion Sort.
 - (d) Merge Sort.
10. What will be the best case time complexity of merge sort ?
- (a) $O(n \log n)$.
 - (b) $O(n^2)$.
 - (c) $O(n^2 \log n)$.
 - (d) $O(n \log n^2)$.
11. To access the services of the operating system, the interface is provided by the _____.
- (a) Library.
 - (b) System calls.
 - (c) Assembly instructions.
 - (d) API.

12. Which one of the following is not true ?
- (a) Kernel remains in the memory during the entire computer session.
 - (b) Kernel is made of various modules which can not be loaded in running operating system.
 - (c) Kernel is the first part of the operating system to load into memory during booting.
 - (d) Kernel is the program that constitutes the central core of the operating system.
13. Which one of the following errors will be handle by the operating system ?
- (a) Lack of paper in printer.
 - (b) Connection failure in the network.
 - (c) Power failure.
 - (d) All of the mentioned.
14. If a process fails, most operating system write the error information to a _____.
- (a) New file.
 - (b) Another running process.
 - (c) Log file.
 - (d) None of the mentioned.
15. Which one of the following is not a real time operating system?
- (a) RTLinux.
 - (b) Palm OS.
 - (c) QNX.
 - (d) Vx Works
16. Cascading termination refers to the termination of all child processes if the parent process terminates _____.
- (a) Normally or abnormally.
 - (b) Abnormally.
 - (c) Normally.
 - (d) None of the mentioned.
17. Transient operating system code is a code that _____.
- (a) Stays in the memory always.
 - (b) Never enters the memory space.
 - (c) Comes and goes as needed.
 - (d) Is not easily accessible.

18. What will happen in the single level directory ?
- (a) All files are contained in the same directory.
 - (b) All files are contained in different directories all at the same level.
 - (c) Depends on the operating system.
 - (d) None of the mentioned.
19. On systems where there are multiple operating system, the decision to load a particular one is done by _____.
- (a) Process control block.
 - (b) File control block.
 - (c) Boot loader.
 - (d) Bootstrap.
20. Which of the following is known as a set of entities of the same type that share same properties, or attributes ?
- (a) Relation set.
 - (b) Tuples.
 - (c) Entity set.
 - (d) Entity Relation model.
21. _____ operations do not preserve non-matched tuples.
- (a) Left outer join.
 - (b) Inner join.
 - (c) Natural join.
 - (d) Right outer join.
22. The user IDs can be added or removed using which of the following fixed roles ?
- (a) db_sysadmin.
 - (b) db_accessadmin.
 - (c) db_securityadmin.
 - (d) db_setupadmin.
23. After groups have been established, SQL applies predicates in the _____ clause, allowing aggregate functions to be used.
- (a) Where.
 - (b) Having.
 - (c) Group by.
 - (d) With.
24. _____ is a software development activity that is not a part of software processes.
- (a) Validation.
 - (b) Specification.
 - (c) Development.
 - (d) Dependence.

25. The activity that distributes estimated effort across the planned project duration by allocating the effort to specific software developing tasks is ———.
- (a) Project scheduling. (b) Detailed schedule.
(c) Macroscopic schedule. (d) None of the mentioned.
26. The Cleanroom philosophy was proposed by ———.
- (a) Linger. (b) Mills.
(c) Dyer. (d) All of the Mentioned.
27. What is the use of a symbol table in compiler design ?
- (a) Finding name's scope.
(b) Type checking.
(c) Keeping all of the names of all entities in one place.
(d) All of the mentioned.
28. A programmer, writes a program to multiply two numbers instead of dividing them by mistake, how can this error be detected ?
- (a) Compiler or interpreter. (b) Compiler only.
(c) Interpreter only. (d) None of the mentioned.
29. Which of the following is a system program that integrates a program's individually compiled modules into a form that can be executed ?
- (a) Interpreter. (b) Assembler.
(c) Compiler. (d) Linking Loader.
30. Which of the following is a Computer Graphics type ?
- (a) Raster and Vector. (b) Raster and Scalar.
(c) Scalar only. (d) All of the above.

31. If the initial side is overlapping on the terminal side, then angle is _____.
(a) 0° . (b) 180° .
(c) 90° . (d) 270° .
32. 1 degree is _____ radian.
(a) π . (b) 0.046.
(c) 0.1746. (d) 0.01746.
33. Which among these are complementary angles ?
(a) $\angle A + \angle B = 90^\circ$. (b) $\angle A + \angle B = 180^\circ$.
(c) $\angle A + \angle B = 60^\circ$. (d) $\angle A + \angle B = 45^\circ$.
34. What is the value of $\tan 48^\circ$?
(a) $\cot 42^\circ$. (b) $\tan 42^\circ$.
(c) $\tan 16^\circ$. (d) $\cot 16^\circ$.
35. The region between an arc and the two radii, joining the centre to the end points of the arc is called _____.
(a) arc. (b) chord.
(c) sector. (d) area of circle.
36. When does both segments and both sectors become equal ?
(a) When two arcs are equal.
(b) When radius = 2* chord.
(c) When two arcs are unequal.
(d) When chord = radius.
37. Find the incorrect option (Assume conventional notations).
(a) $Q = p/q$ where p and q are integers and $q = 0$.
(b) $N = \{1, 2, 3, \dots\}$.
(c) $W = \{0, 1, 2, 3, \dots\}$.
(d) $Z = \{\dots - 2, -1, 0, 1, 2, \dots\}$.

38. How many solutions does a linear equation have ?
- (a) One. (b) Two.
(c) Three. (d) Four.
39. Find the solution for the linear equation $2.5x = 5$?
- (a) $x = -2$. (b) $x = 5$.
(c) $x = 3$. (d) $x = 2$.
40. What are the number of solutions of set of linear equations $x + 2y = 6$ and $3x + 6y = 16$?
- (a) One. (b) Two.
(c) Zero. (d) Infinite.
41. A curve passes through (1, 1) such that the triangle formed by the co-ordinate axes and the tangent at any point of the curve is in the first quadrant and has its area equal to 2. What is the differential equation ?
- (a) $dy/dx = [(xy + 2) \pm \sqrt{(1 + xy)}]/x^2$.
(b) $dy/dx = [(xy - 2) \pm \sqrt{(1 + xy)}]/x^2$.
(c) $dy/dx = [(xy - 2) \pm \sqrt{(1 - xy)}]/x^2$.
(d) $dy/dx = [(xy + 2) \pm \sqrt{(1 - xy)}]/x^2$.
42. What will be the value of $dy/dx - a/x * y = (x + 1)/x$?
- (a) $y = x/(1 - a) - 1/a + cx^a$.
(b) $y = x/(1 + a) + 1/a + cx^a$.
(c) $y = x/(1 - a) - 1/a - cx^a$.
(d) $y = x/(1 + a) - 1/a + cx^a$.
43. What will be the differential equation form of $\sqrt{(a^2 + x^2)}dy/dx + y = \sqrt{(a^2 + x^2)} - x$?
- (a) $a^2 \log (x + \sqrt{(a^2 - x^2)}) + c$.
(b) $a^2 \log (x + \sqrt{(a_2 + x^2)}) + c$.
(c) $a^2 \log (x - \sqrt{(a^2 + x^2)}) + c$.
(d) $a^2 \log (x - \sqrt{(a^2 - x^2)}) + c$.

44. What is the differential equation of all parabolas whose directrices are parallel to the x -axis ?
- (a) $d^3x/dy^3 = 0$. (b) $d^3y/(dx^3 + d^2y/dx^2) = 0$.
(c) $d^3y/dx^3 = 0$. (d) $d^2y/dx^2 = 0$.
45. What will be the general solution of the differential equation $d^2y/dx^2 = e^{2x}(12 \cos 3x - 5 \sin 3x)$? (here, A and B are integration constant)
- (a) $y = e^x \sin 3x + Ax + B$. (b) $y = e^{2x} \sin 3x + Ax + B$.
(c) $y = e^{2x} \sin 3x + A$. (d) Data inadequate.
46. What is the solution of the given equation $(D + 1)^2y = 0$ given $y = 2 \log_e 2$ when $x = \log_e 2$ and $y = (4/3) \log_e 3$ when $x = \log_e 3$?
- (a) $y = 4xe^{-x}$. (b) $y = 4xe^x$.
(c) $y = -4xe^{-x}$. (d) $y = -4xe^x$.
47. Which of the following is the valid differential equation $x = a \cos (\alpha t + \beta)$?
- (a) $d^2x/dt^2 - \alpha x = 0$. (b) $d^2x/dt^2 + \alpha x = 0$.
(c) $d^2x/dt^2 - \alpha^2x = 0$. (d) $d^2x/dt^2 + \alpha^2x = 0$.
48. If the order of the matrix is $m \times n$, then how many elements will there be in the matrix ?
- (a) mn . (b) $m^2 n^2$.
(c) mn^2 . (d) $2mn$.
49. Which of the following condition is incorrect for matrix multiplication ?
- (a) $A(BC) = (AB)C$. (b) $A(B + C) = AB + AC$.
(c) $AB = 0$ if either A or B is 0. (d) $AB = BA$.
50. The matrix which follows the conditions $m = n$ is called ?
- (a) Square matrix. (b) Rectangular matrix.
(c) Scalar matrix. (d) Diagonal matrix.
51. The matrix which follows the condition $m > n$ is called as _____.
- (a) Vertical matrix. (b) Horizontal matrix.
(c) Diagonal matrix. (d) Square matrix.

52. What is the area of the triangle if the vertices are $(0, 2)$, $(0, 0)$, $(3, 0)$?

- (a) 1 sq.unit.
- (b) 5 sq.units.
- (c) 2 sq.units.
- (d) 3 sq.units.

53. Which of the following is not the property of transpose of a matrix ?

- (a) $(A')' = A$.
- (b) $(A + B)' = A' + B'$.
- (c) $(AB)' = (BA)'$.
- (d) $(kA)' = kA'$.

54. What are the kinds of discontinuity ?

- (a) Minor and major kinds.
- (b) Increment and decrement kinds.
- (c) First and second kinds.
- (d) Zero and one kinds.

55. What is/are conditions for a function to be continuous on (a, b) ?

- (a) The function is continuous at each point of (a, b) .
- (b) The function is right continuous
- (c) The function is left continuous.
- (d) Right continuous, left continuous, continuous at each point of (a, b) .

56. Function f should be _____ on $[a, b]$ according to Rolle's theorem.

- (a) Continuous.
- (b) Non-continuous.
- (c) Integral.
- (d) Non-existent.

57. What are/is the conditions to satisfy Lagrange's mean value theorem ?

- (a) f is continuous on $[a, b]$
- (b) f is differentiable on (a, b)
- (c) f is differentiable and continuous on (a, b) .
- (d) f is differentiable and non-continuous on (a, b) .

58. Differentiate $8e^{-x} + 2e^x$ w.r.t x .

(a) $2e^{-x} + 8e^x$.

(b) $2e^x + 8e^{-x}$.

(c) $2e^{-x} - 8e^x$.

(d) $2e^x - 8e^{-x}$.

59. If E and F are two events associated with the same sample space of a random experiment then $P(E|F)$ is given by _____.

(a) $P(E \cap F) / P(F)$, provided $P(F) \neq 0$.

(b) $P(E \cap F) / P(F)$, provided $P(F) = 0$.

(c) $P(E \cap F) / P(F)$.

(d) $P(E \cap F) / P(E)$.

60. Given that E and F are events such that $P(E) = 0.6$, $P(F) = 0.3$ and $P(E \cap F) = 0.2$, then $P(E|F)$?

(a) $1/3$.

(b) $2/3$.

(c) $3/4$.

(d) $1/4$.

61. What is the measure of central tendency that is most affected by outliers?

(a) Mean.

(b) Median.

(c) Mode.

(d) Range.

62. A factory produces pens, and the probability of a pen being defective is 0.03. If a customer buys 20 pens, what is the probability that none of them are defective? Assume the pens are independent.

(a) 0.742.

(b) 0.658.

(c) 0.857.

(d) 0.635.

63. What is the formula for the co-efficient of variation?

(a) $(\text{Standard Deviation} / \text{Mean}) * 100$.

(b) $(\text{Mean} / \text{Standard Deviation}) * 100$.

(c) $(\text{Variance} / \text{Mean}) * 100$.

(d) $(\text{Mean} / \text{Variance}) * 100$.

64. In a chi-squared test, what does the chi-squared statistic measure ?
- (a) The difference between observed and expected frequencies.
 - (b) The probability of observing a particular outcome.
 - (c) The goodness of fit between observed and expected frequencies.
 - (d) The probability of a Type I error.
65. What is the standard deviation of a binomial distribution ?
- (a) n .
 - (b) $np(1 - p)$.
 - (c) $\sqrt{n}$.
 - (d) $\sqrt{np(1 - p)}$.
66. What is the formula for the coefficient of determination (R-squared) in linear regression ?
- (a) $\sqrt{1 - SS_{\text{reg}}/SS_{\text{tot}}}$.
 - (b) $\sqrt{SS_{\text{reg}} / SS_{\text{tot}}}$.
 - (c) $SS_{\text{reg}} / SS_{\text{tot}}$.
 - (d) $1 - SS_{\text{reg}}/SS_{\text{tot}}$.
67. A company wants to test if there is a significant difference in the mean sales between two different store locations. Which statistical test should the company use ?
- (a) Pearson correlation.
 - (b) Wilcoxon signed-rank test.
 - (c) Mann-Whitney U test.
 - (d) Independent t -test.
68. Which measure of skewness indicates a distribution with a longer tail to the left ?
- (a) Positive skewness.
 - (b) Negative skewness.
 - (c) Zero skewness.
 - (d) Right skewness.
69. What is the formula for calculating the z -score ?
- (a) $(X - \mu)/\sigma$.
 - (b) $(X - \sigma)/\mu$.
 - (c) $(X - \sigma) * \mu$.
 - (d) $(X + \mu)/\sigma$.
70. In Bayesian inference, what does the likelihood function represent ?
- (a) Prior beliefs about the parameters.
 - (b) Probability of observing the data given the parameters.
 - (c) Probability of the parameters given the data.
 - (d) Posterior distribution of the parameters.

71. What is the formula for calculating kinetic energy ?
- (a) $KE = mv$. (b) $KE = \frac{1}{2} mv^2$.
(c) $KE = mgh$. (d) $KE = Fd$.
72. A projectile is launched from the ground with an initial velocity of 30 m/s at an angle of 60 degrees above the horizontal. Calculate the maximum height reached by the projectile. (Take acceleration due to gravity as 9.8 m/s^2)
- (a) 10.5 meters. (b) 15.0 meters.
(c) 20.5 meters. (d) 25.0 meters.
73. What does the Heisenberg uncertainty principle state ?
- (a) The position and momentum of a particle cannot both be precisely determined simultaneously.
(b) The energy and time of a particle cannot both be precisely determined simultaneously.
(c) The wavelength and frequency of a wave cannot both be precisely determined simultaneously.
(d) The speed and direction of a particle cannot both be precisely determined simultaneously.
74. What happens to the force between two point charges when the distance between them is doubled ?
- (a) The force is halved. (b) The force is doubled.
(c) The force remains the same. (d) The force becomes zero.
75. According to special relativity, what happens to the mass of an object as its velocity approaches the speed of light ?
- (a) The mass decreases. (b) The mass increases without bound.
(c) The mass remains constant. (d) The mass becomes zero.

76. A block of mass 5 kg. is initially at rest on a frictionless horizontal surface. A force of 20 N is applied horizontally to the block, causing it to move. Calculate the velocity of the block after it has traveled 10 meters. (Assume no external forces act on the block) :
- (a) 4 m/s. (b) 6 m/s.
(c) 8 m/s. (d) 10 m/s.
77. What is the primary source of energy production in stars like the Sun ?
- (a) Nuclear fusion. (b) Nuclear fission.
(c) Chemical reactions. (d) Gravitational collapse.
78. A radioactive substance has a half-life of 10 days. If the initial mass of the substance is 100 grams, how much of it will remain after 30 days ?
- (a) 6.25 grams. (b) 12.5 grams.
(c) 25 grams. (d) 50 grams.
79. Which particle is responsible for mediating the electromagnetic force ?
- (a) Photon. (b) Electron.
(c) Proton. (d) Neutrino.
80. An object is placed 20 cm. in front of a converging lens with a focal length of 10 cm. Calculate the position of the image formed by the lens.
- (a) 10 cm. in front of the lens. (b) 20 cm. in front of the lens.
(c) 30 cm. in front of the lens. (d) 10 cm. behind the lens.
81. What is the functional group present in an alcohol molecule ?
- (a) - OH. (b) - COOH.
(c) - CHO. (d) - NH₂.
82. Calculate the change in entropy when 1 mole of ice at - 10°C is melted and heated to form steam at 100°C. (Given : $\Delta H_{\text{fus}} = 6.01 \text{ kJ/mol}$, $\Delta H_{\text{vap}} = 40.79 \text{ kJ/mol}$, specific heat capacity of water = $4.18 \text{ J/g}^\circ\text{C}$).
- (a) 110.47 J/K. (b) 116.58 J/K.
(c) 122.69 J/K. (d) 128.80 J/K.

83. Which law states that the total pressure of a mixture of gases is equal to the sum of the partial pressures of the individual gases ?
- (a) Boyle's law. (b) Charles's law.
(c) Dalton's law. (d) Gay-Lussac's law.
84. A solution contains 0.025 moles of NaOH in 500 mL of water. Calculate the pH of the solution. (Assume complete dissociation of NaOH)
- (a) 12.00. (b) 12.30.
(c) 12.60. (d) 12.90.
85. Which technique is used to separate components of a mixture based on their different affinities for a stationary phase ?
- (a) Spectroscopy. (b) Chromatography.
(c) Titration. (d) Electrophoresis.
86. Calculate the isoelectric point (pI) of a dipeptide composed of alanine ($pK_a = 2.34$) and lysine ($pK_a = 10.53$).
- (a) 4.43. (b) 6.08.
(c) 7.94. (d) 9.45.
87. Acid rain is primarily caused by the emission of :
- (a) Carbon dioxide. (b) Sulfur dioxide.
(c) Nitrogen dioxide. (d) Methane.
88. Which computational method is commonly used to calculate molecular properties and interactions ?
- (a) Molecular dynamics. (b) Density functional theory (DFT).
(c) Hartree-Fock method. (d) Monte Carlo simulation.
89. Which industrial process is used to produce ammonia from nitrogen and hydrogen gases ?
- (a) Haber-Bosch process. (b) Solvay process.
(c) Contact process. (d) Claus process.

90. The rate constant for a first-order reaction is 0.02 min^{-1} . If the initial concentration of the reactant is 0.10 M, how much time will it take for the concentration to decrease to 0.025 M ?
- (a) 34.65 minutes. (b) 46.05 minutes.
(c) 57.45 minutes. (d) 68.85 minutes.
91. If all mammals are warm-blooded animals, and a bat is a mammal, what can be logically concluded ?
- (a) All mammals are bats.
(b) Bats are warm-blooded animals.
(c) All warm-blooded animals are mammals.
(d) All mammals can fly.
92. Every time I eat strawberries, I get a stomach-ache. What can I conclude ?
- (a) I am allergic to strawberries.
(b) Strawberries cause stomach-aches in everyone.
(c) I should eat more strawberries.
(d) Strawberries are the only cause of stomach-aches.
93. If a triangle has angles measuring 60° and 80° , what is the measure of the third angle ?
- (a) 20° . (b) 40° .
(c) 60° . (d) 80° .
94. If a store sells a product for \$ 20, which includes a 25 % profit margin, what is the cost of the product to the store ?
- (a) \$10. (b) \$12.50.
(c) \$15. (d) \$16.
95. What letter comes next in the series : A, C, F, J, O,... ?
- (a) S. (b) P.
(c) R. (d) Q.

96. A survey finds that 90 % of people who drink green tea regularly report improved health. What inference can be made ?
- (a) Green tea improves health for everyone.
 - (b) 90 % of people have improved health.
 - (c) People with improved health tend to drink green tea regularly.
 - (d) Drinking green tea has no effect on health.
97. If a rectangle has a perimeter of 40 meters and a length-to-width ratio of 3 : 2, what are the dimensions of the rectangle ?
- (a) 8 m. $\times$ 12 m.
 - (b) 6 m. $\times$ 14 m.
 - (c) 10 m. $\times$ 15 m.
 - (d) 12 m. $\times$ 18 m.
98. If a recipe calls for $\frac{3}{4}$ cup of flour and you want to make 3 batches, how many cups of flour do you need in total ?
- (a) $\frac{1}{4}$ cup.
 - (b) $\frac{3}{4}$ cup.
 - (c) $1 \frac{1}{4}$ cups.
 - (d) $2 \frac{1}{4}$ cups.
99. If P is the brother of Q, Q is the sister of R, and R is the father of S, then how is P related to S ?
- (a) Brother.
 - (b) Sister.
 - (c) Father.
 - (d) Mother.
100. In a certain code language, "123" means "hot filtered coffee", "356" means "very hot day" and "589" means "day and night". Which digit means "very" ?
- (a) 9.
 - (b) 6.
 - (c) 5.
 - (d) 3.