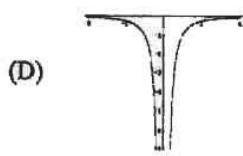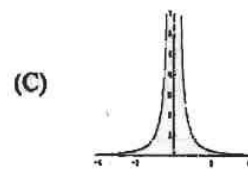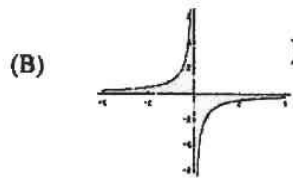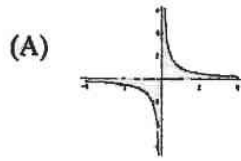The Department of Computer Science, University of Karachi does not take any responsibility whatsoever for the information contained within this document.

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> Each Question is followed by the five choices. Choose the best choice and write corresponding letter (A – E) on the **ANSWER SHEET**

Q.01. Out of 35 programmers, 25 know FORTRAN, 28 know Pascal and 2 know neither. How many know both the languages?

(A) 5   (B) 10   (C) 20   (D) 30   (E) None of these

Q.02. The possible values of x whose image is 2 under $f(x) = x - \dfrac{15}{x}, x \neq 0, x \in R$ are

(A) 5, –3   (B) –5, 3   (C) –5, –3   (D) 5, 3   (E) None of these

Q.03. A function f is defined by $f(x) = ax + b, x \in R$.
The images of 1 and 5 are –2 and 10 respectively. The values of a and b are

(A) 5, –3   (B) –5, 3   (C) –5, –3   (D) 3, –5   (E) None of these

Q.04. The range of the function $y = f(x) = -|x - 2| \ for -2 \leq x \leq 4$ is

(A) $y < 0$ (B) $y \leq 0$ (C) $y > 0$ (D) $y \geq 0$ (E) None of these

Q.05. Given that the tangent to the curve $y = ax^2 + \dfrac{b}{x}$ has slope 4 at the point (1,5). Then the values of a and b are

(A) 2, 1   (B) 3, 2   (C) 2, 3   (D) 1, 3   (E) None of these

Q.06. The equation of a curve passes through the points $\left(\dfrac{1}{5}, -10\right)$ and $(1,2)$ and whose tangent has a slope, which is inversely proportional to x^2 is

(A) $y = -\dfrac{1}{x} + 5$ (B) $y = -\dfrac{3}{x} + 7$ (C) $y = -\dfrac{3}{x} - 5$

(D) $y = -\dfrac{3}{x} + 5$ (E) None of these

Q.07. The area bounded in the first quadrant by the x-axis, the line x=2 and part of the curve with parametric equations, $x = 2t^2$, $y = 2t$ is

(A) a function of t   (B) Very large   (C) 8/3   (D) 16   (E) None of these

Q.08. The value of n while x + 2 is a factor of $4x^3 + 3x^2 + nx - 12$ is

(A) 16   (B) 32   (C) –16   (D) 0   (E) None of these

Q.09. The volume generated when the shaded region is rotated through 360 about the x-axis in cubic unit is

(A) 8π (B) 0.8π (C) π (D) 16π (E) None of these

Q.10. One root of the equation $x^3 - x^2 - 2x + 2 = 0$ is x = 1. Then other two roots are

(A) rational numbers   (B) complex numbers
(C) equal in magnitude but opposite in direction   (D) impossible to find   (E) None of these

Q.11. If $\displaystyle\int_0^{\pi/3} \cos^n x \sin x \, dx = \dfrac{1}{64}$, then n is

(A) 1   (B) 2   (C) 3   (D) 4   (E) None of these

Q.12. The graph of $y = \dfrac{1}{x}$ could be

(A)

(B)

(C)

(D)

(E)
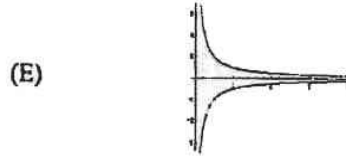
Q.13. An equation of the plane through the points (1,2,3), (4,5,6) and (7,8, –9) is

(A) $x + 2y - z = -2$ (B) $x - y = -1$ (C) $x + y - 2z = -3$
(D) $y - z = -1$ (E) None of these

Q.14. The function $f(x, y) = \dfrac{x + y}{\sqrt{x} + \sqrt{y}}$ is a homogeneous function of degree

(A) 1   (B) 1/2   (C) 0   (D) – 1/2   (E) – 1

Q.15. $\displaystyle \lim_{x \to \infty} \dfrac{x^4}{e^x}$ is

(A) 24   (B) Zero   (C) ∞ (D) $\dfrac{\infty}{\infty}$ (E) None of these

Q.16. First three terms of the Maclaurin's series of the function $e^{Sin\,x}$ are

(A) $1 - x + \dfrac{x^2}{2}$ (B) $1 + x + \dfrac{x^2}{2}$ (C) $1 - x - \dfrac{x^2}{2}$

(D) $-1 + x - \dfrac{x^2}{2}$ (E) None of these

Q.17. The equations of the line through origin and parallel to line given by
$x + y + z + 4 = 0$, $x - y - z + 3 = 0$ are

(A) $x = 0, y + z = 0$ (B) $y = 0, x + z = 0$ (C) $z = 0, x + y = 0$
(D) $x = y = z$ (E) None of these

Q.18. Values of x and y satisfying $i(x + iy) = 1 + i$ where $i = \sqrt{-1}$, are respectively

(A) –1, 1   (B) 1,1   (C) –1, –1
(D) 1, –1   (E) None of these

Q.19. The value of the expression $\dfrac{(\cos\alpha - i\sin\alpha)^{-9}}{(\cos(3\alpha) - i\sin(3\alpha))^3}$ is

(A) $(\cos(9\alpha) + i\sin(9\alpha))^2$ (B) $(\cos(9\alpha) + i\sin(9\alpha))$ (C) $(\cos(9\alpha) - i\sin(9\alpha))$
(D) $(\cos(5\alpha) + i\sin(5\alpha))$ (E) None of these

Q.20. The principal logarithm of $1 - i$ is

(A) $\dfrac{1}{2}\ln 2 + \dfrac{3\pi}{4}i$ (B) $\dfrac{1}{2}\ln 2 - \dfrac{3\pi}{4}i$ (C) $-\dfrac{1}{2}\ln 2 + \dfrac{3\pi}{4}i$

(D) $-\dfrac{1}{2}\ln 2 - \dfrac{3\pi}{4}i$ (E) $\dfrac{1}{2}\ln 2 - \dfrac{\pi}{4}i$

Q.21. A set of vectors which generates R^3 is

(A) $\{(1,0,0),(0,1,0),(1,1,0)\}$ (B) $\{(1,2,3),(4,5,6),(7,8,9)\}$ (C) $\{(0,1,0),(1,1,0),(0,0,0)\}$
(D) $\{(1,0,0),(0,1,0),(0,0,2)\}$ (E) None of these

Q.22. The dimension of the vector space spanned by $x^4 - x^2 + x + 4$ and $3x^4 - 3x^2 + 3x + 12$ is

(A) 1   (B) 2   (C) 3   (D) 4   (E) 5

Q.23. If the matrix $G = \begin{bmatrix} 2 & -2 \\ 1 & -1 \end{bmatrix}$, then

(A) G^{-1} exists   (B) G is non-singular   (C) G is idempotent
(D) G is nilpotent   (E) G is periodic of period 4

Q.24. A possible solution of the differential equation $6y''(x) + 5y'(x) - 6y(x) = 6x$ is

(A) $e^{\frac{2x}{3}} + 6x$ (B) $e^{\frac{-3x}{2}} - 6x$ (C) $e^{\frac{-3x}{2}} + e^{\frac{2x}{3}} - x + \frac{5}{6}$

(D) $e^{\frac{2x}{3}} + e^{\frac{-3x}{2}}$ (E) $-x - \frac{5}{6}$

Q.25. The differential equation $6y''(x) + 9(y'''(x))^2 = Cos^4 x$ is of

(A) second order and third degree   (B) third order and first degree
(C) third order and four degree   (D) third order and second degree
(E) four order and second degree

Q.26. The differential equation of the orthogonal trajectories of the family of straight lines $y = m x$ is

(A) $y' = m$ (B) $y' = -\frac{1}{m}$ (C) $x + y y' = 0$

(D) $y' = \frac{y}{x}$ (E) None of these

Q.27. The value of the determinant

$$\begin{vmatrix} 1 & 2 & 3 & 4 \\ 5 & 6 & 7 & 8 \\ 9 & 10 & 11 & 12 \\ 13 & 14 & 15 & 16 \end{vmatrix} \text{ is}$$

(A) 1234   (B) 5678   (C) 9101112   (D) 13141516   (E) 0

Q.28. Consider the homogeneous system of equations
$$\lambda x + y = 0$$
$$\lambda x - y = 0$$
The only possible value of λ for which this system has non trivial solutions is
(A) 4   (B) 3   (C) 2   (D) 1   (E) 0

Q.29. The equation of the sphere whose center is on the line x = y = z and which passes though the point $(0, 0, 2 + \sqrt{6})$ is

(A) $x^2 + y^2 + 2z^2 - 4x - 4y = 0$ (B) $x^2 + 2y^2 + 3z^2 - 4x + 5y = 0$
(C) $x^2 + y^2 + z^2 - 4x - 4y - 4z - 2 = 0$ (D) $x^2 + y^2 + 2z^2 - x - 4y + 3z = 0$
(E) $x^2 + y^2 + z^2 = 9$

Q.30. The function $y = Sin\ x\ Cos\ x$ is periodic of period

(A) 1   (B) 2   (C) 3
(D) 4   (E) None of these

Q.31. A frequency table for discrete data is given:

Class Intervals	Frequency
83 – 87	10
88 – 92	54
93 – 97	12
98 – 102	11
Total	87

If a data value is randomly selected from the given total, then the probability that its value will lie between 88 and 102 is:

(A) $\dfrac{77}{87}$

(B) 14

(C) 19

(D) $\dfrac{87}{77}$

(E) 77

Q.32. If A_1 and A_2 are two events in a sample space S and A_1 and A_2 are independent with probabilities, $P(A_1) = 0.7$ and $P(A_2) = 0.5$, then $P(A_1 \cup A_2)$ is equal to:

(A) 0.80   (B) 1.55   (C) 1.20   (D) 0.35   (E) 0.85

Q.33. Let X be a random variable which is normally distributed with p.d.f.

$$f(x) = \frac{2}{\sqrt{2\pi}} \exp(8x - 2x^2 - 8).$$

Then mathematical expectation and standard deviation of x are respectively:

(A) $2, \dfrac{1}{4}$

(B) $8, \dfrac{1}{4}$

(C) $8, \dfrac{1}{2}$

(D) 8, 1

(E) $2, \dfrac{1}{2}$

Q.34. If Z is a standard normal variable, and $P[Z \le 1.25] = 0.8944$, then $[Z \le -1.25]$ is equal to:

(A) 0.3954   (B) 0.3944   (C) 0.8944   (D) 0.1056   (E) $- 0.8944$

Q.35. In a sample of 5 observations, the first four deviations from the mean are: 0.3, 0.9, 1.0, 1.3. Then the fifth deviation from the mean is equal to:

(A) $- 3.5$ (B) 0.875   (C) $- 0.875$ (D) 2.1   (E) 2.3

Q.36. A sample of 300 urban residents of a particular region revealed that 63 favored increasing the highway speed limit from 55 to 65 mph, while a sample of 180 rural residents yielded 75 who favored the above mentioned increase in the speed limit. If we want to make a statistical test to test the hypothesis that both rural and urban residents are of the same opinion, then the proper test that would be used is the:

(A) Z – test   (B) chi – square test   (C) t – test   (D) F – test   (E) Ratio – test

Q.37. If a random variable X follows a normal probability model with mean 30 and standard deviation 0.5, then X can be transformed to a standard normal variable by:

(A) $\dfrac{X - 0.5}{30}$

(B) $\dfrac{X + 30}{0.5}$

(C) $\dfrac{30 - X}{0.5}$

(D) $\dfrac{X - 30}{0.5}$

(E) $\dfrac{X + 0.5}{30}$

Q.38. In regression problems, we often consider regression by the expression: $y = \alpha \exp(\beta x)$. Then it can be transformed to a linear form:

(A) $\log y = \log \alpha + \beta x$

(B) $y = \alpha + \beta x$

(C) $y = \alpha \beta x$

(D) $\log y = \beta x$

(E) $\log y = \beta \log \alpha + x$

Q.39. Suppose the random variable X follows the following probability mass function:

X	−1	0	1
p(X)	0.3	0.4	0.3

Then the variance of X is:

(A) $- 3.6$ (B) Zero   (C) 0.18   (D) 3.6   (E) 0.6

Q.40. Let K and L are two sets:
K = {S, FS, FFS}, L = {S, FFS, FFFFS}. Then K ∩ L is:

(A) {S, FFS, FS}   (B) {S, FS, FFS, FFFFS}   (C) {S}
(D) ∅   (E) {S, FFS}

Q.41. A person who coordinates all related activities and needs for a corporation's database is called

_____.

(A) Systems Analyst   (B) Database Master   (C) Database Manager
(D) Databaser   (E) Database Administrator

Q.42. A _____ database is one that is stored on different computers in different locations connected by a client/server network.

(A) Relational   (B) Network   (C) Hierarchical
(D) Distributed   (E) Non-autonomous

Q.43. A _____ is a unit of data belonging to a specific domain and consisting of one or more characters.

(A) Field   (B) Record   (C) File   (D) Database   (E) Data storage

Q.44. The text-only files that contain no graphics and no formatting, such as boldface or italics are called _____ files.

(A) ASCII   (B) Executable   (C) Programme   (D) Computer   (E) Command

Q.45. The _____ is a data file containing relatively permanent records that are generally updated periodically.

(A) Transaction file   (B) RAM file   (C) Cache file
(D) ROM file   (E) Master file

Q.46. In _____ processing, data is collected over several days or weeks and then processed all at one time against a master file.

(A) Online   (B) Data   (C) Batch   (D) Multi   (E) Transaction

Q.47. The _____ database relates, or connects, data in different files through the use of a key field, or common data elements.

(A) Hierarchical   (B) Network   (C) Relational
(D) Distributed   (E) Object-oriented

Q.48. A document that stores the definitions or descriptions of the structure of data used in the database is called _____.

(A) Data directory   (B) Data dictionary   (C) Data file
(D) Database   (E) Data encyclopaedia

Q.49. Which of the following is not a relational database query element?

(A) Select   (B) Modify   (C) Insert   (D) Delete   (E) Read

Q.50. Which of the following is not a valid SQL query.

(A) Select * from Product
(B) Select Product from Manufacturer
(C) Select * from Manufacturer where Price = 100.00
(D) Select Manufacturer from Product where Price Not = 500.00
(E) Select Product, Manufacturer from * where Price < 1000.00

Q.51. Which of the following statements will round the variable X up to the next integer.

(A) int (X)   (B) int (X + 0.1)   (C) int (X + 0.5)   (D) int (X + 0.9)   (E) int (X − 0.5)

Q.52. If you want to interchange the values stored in the variables A and B, which one of the following instructions you will write?

(A) A = B; B = A;   (B) B = A; A = B;   (C) A = T; T = B; B = A;
(D) T = A; A = B; B = A; (E) T = B; B = A; A = T;

Q.53. For finding the representation for a negative value, you would have to write down the representation for the corresponding positive value, and then _____.

(A) Complement the entire pattern
(B) Complement the entire pattern, and then add 1 to the result
(C) Complement the entire pattern, and then subtract 1 from the result
(D) Add 1 to it, and then complement the entire pattern
(E) Subtract 1 from it, and then complement the entire pattern

Q.54. In _____ system, each pattern is designed to contain an even number of 1s, and thus an error is signalled by the occurrence of a pattern with an odd number of 1s.

(A) Parity check   (B) Odd parity   (C) Even parity
(D) Parity bits   (E) Error-correcting codes

Q.55. The control unit of a computer performs its job by continually repeating what is called the machine cycle, which consists of the three steps in this order: _____.

(A) Fetch, encode and execute   (B) Encode, fetch and execute
(C) Fetch, execute and decode   (D) Decode, fetch and execute
(E) Fetch, decode and execute

Q.56. RISC stands for _____ instruction set computer.

(A) Residual   (B) Relational   (C) Related   (D) Reduced   (E) Real

Q.57. Digital data can be converted into audio signals by _____.

(A) Telephone   (B) Modem   (C) Cable   (D) Computer   (E) None of these

Q.58. A _____ is a data structures in which the data is ordered in a last-in-first-out fashion.

(A) Array   (B) Linked list   (C) Stack   (D) Queue   (E) Tree

Q.59. OSI stands for _____.

(A) Open Systems Interconnection   (B) Open Systems Interfacing
(C) Open Systems Interchange   (D) Open Systems Intersection
(E) Open Systems Intelligence

Q.60. In _____ structures, a collection of instructions is repeated in a looping manner.

(A) Data   (B) Iterative   (C) Recursive   (D) Variable   (E) Serial

Q.61. When each process ends up waiting for the other to finish, this condition is called _____.

(A) Locked   (B) Deadlock   (C) Error
(D) Hacking   (E) Parity check

Q.62. Which of the following is not a sorting algorithm?

(A) Bubble   (B) Binary   (C) Radix
(D) Quick   (E) Selection

Q.63. The value that is associated with a name and can not be changed throughout the execution of the program is called.

(A) Variable   (B) Identifier   (C) Set
(D) Constant   (E) Subscript

Q.64. Any transfer of data between the two parts of a program is done by listing the items called _____.

(A) Interface   (B) Arguments   (C) Parameters
(D) Syntax   (E) Subprogram

Q.65. ISDN stands for _____.

(A) Integrated Services Digital Network
(B) Integrated Services Distributed Network
(C) Integrated Serial Digital Network
(D) Integrated Serial Distributed Network
(E) International Subscriber Digital Network

Q.66. A _____ is a pictorial representation of the data paths in a system.

(A) Dataflow diagram   (B) Entity-relationship diagram   (C) Flowchart
(D) System diagram   (E) Datamation diagram

Q.67. JVM stands for _____.

(A) Java Visual Model   (B) Java Virtual Model   (C) Java Visual Machine
(D) Java Virtual Machine   (E) Java Virtual Monitor

Q.68. A _____ is a communications network that covers a geographic area the size of a city or suburb.

(A) Wide area network   (B) Metropolitan area network
(C) Local area network   (D) Fibre optics network
(E) Wireless communication network

Q.69. A _____ LAN is one in which all microcomputers on the network communicate directly with one another without relying on a server.

(A) Digital   (B) Client/server   (C) Peer-to-peer
(D) Novell   (E) Personal

Q.70. Which of the following is not a network topology?

(A) Ring   (B) Network   (C) Bus
(D) Analogue   (E) Hybrid

Q.71. A 180 lb man stands in an accelerator. The force in lbs that the floor exerts on the man when the elevator is moving upward, but decelerating at 8 ft/sec ^{2}, is closet to which of the following?

(A) 23 0   (B) 90   (C) 18
(D)225   (E)225

Q.72. A couple consists of two equal forces that act along parallel lines in opposite directions. if each of the forces in a couple has the magnitude F and their lines of action are d apart, the torque exerted by the couple is

(A) $F^2 d$ (B) F/d   (C) Fd^2
(D) Fd   (E) Fd /2

Q.73. A small object is 10 cm in front of a plane mirror. If you stand behind the object, 30cm from the mirror, and look at its image, for what distance must you focus your eyes?

(A) 25 cm   (B) 35 cm   (C) 45 c m
(D) 40 cm   (E) 50 cm

Q.74. If a parallel beam of light of energy density U falls normally on an object and is totally reflected, the pressure it exerts on the object is given by

(A) p=U/c   (B) p=1/3U   (C) p=Uc
(D) p=2U   (E) U/2c

Q.75. If a system is caused to change reversibly from an initial state by adiabatic means only,

(A) the work done is different for different adiabatic paths connecting the two states.
(B) the work done is the same for all adiabatic paths connecting the two states.
(C) there is no work done since there is no transfer of heat energy.
(D) the total energy of the system will not change.
(E) the total internal energy of the system will change according to different paths.

Q.76. According to the classical equi-partition of energy theorem, each degree of freedom in which the appropriate coordinate appears quadratically has an average energy of

(A) kT   (B) kT/3   (C) 3kT/2
(D) kT/2   (E) kT/4

Q.77. A piece of copper wire is cut into ten equal parts. These parts are connected in parallel. The joint resistance of the parallel combination will be equal to original resistance of single wire, multiplied by a factor of

(A) .01   (B) 0.1   (C) 1.0
(D)10   (E)20

Q.78. An electron moving with a kinetic energy of 5000 eV enters a uniform magnetic field of 200 gauss perpendicular to its direction of motion . The radius of the path of the electron in the magnetic field is

(A)12 cm   (B) 0.12 cm   (C) 120 cm
(D) 1200 cm   (E) 1.2 cm

Q.79. Classically, an electron of a hydrogen atom moves in a orbit of radius 0.53×10^{-8} cm with a frequency of 6.6×10^{15} sec^{-1}. The current in this orbit is

(A) 1.05×10^{-4} amp   (B) 1.05×10^{-3} amp   (C) 1.05×10^{-1} amp
(D) 1.05×10^{-5} amp   (E) 1.05×10^{-2} amp

Q.80. Assuming that a certain star emits black body radiation of 6000 °K. The wave length of maximum emission intensity per unit wave length will be in the range of

(A) 5000 Å   (B) 2500 Å   (C) 3500 Å
(D) 8000 Å   (E) 9990 Å

Q.81. _____ are not wanted here. Everyone must comply with rules and regulations.

(A) disputants   dissidents   (B) dissidents   (C) daredevils
(D) demagogues   (E) lawless

Q.82. He managed to _____ his son from making a career of automobile racing.

(A) persuade   (B) mislead   (C) dissuade
(D) dismiss   (E) deceive

Q.83. People must make a _____ journey today as the main roads are closed.

(A) prolonged   (B) circuitous   (C) derailed
(D) extended   (E) long

Q.84. The accused was acquitted as the evidence against him was mostly _____.

(A) circumspect   (B) flimsy   (C) vague
(D) circumstantial   (E) fake

Q.85. You should trim the roots every fortnight to _____ the growth of bonsai.

(A) stop   (B) inhabit   (C) detain
(D) discourage   (E) dampen

Q.86. "We tried very hard but could not _____ Grandma to travel by air," she said.

(A) push   (B) encourage   (C) induce
(D) propagate   (E) ask

Q.87. Her early illness was an _____ to the complete development of her vocal chords.

(A) impediment   (B) obstruction   (C) annoyance
(D) inhibition   (E) excess

Q.88. _____ all shops in Pakistan close on the 14 of August for the celebrations of the independence day.

(A) totally   (B) actually   (C) absolutely
(D) supposedly   (E) virtually

Q.89. When all the liquid had _____ crystals of copper sulphate were left in the beaker.

(A) vanished   (B) disappeared   (C) evaporated
(D) disintegrated   (E) destroyed

Q.90. "My cat is _____ to colds and has to sleep under a blanket every night," the little girl said.

(A) liable   (B) susceptible   (C) familiar
(D) drawn   (E) allergic