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By Amit Katiyar (MCA-JNU)



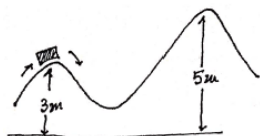
- Let  $X$  be a continuous random variable such that  $E[X] < \infty$  and  $P\left(x \geq \frac{1}{2} + x\right) = P\left(x \geq \frac{1}{2} - x\right)$  for all  $x \in \mathbb{R}$ . Then
  - $E(X) = \frac{1}{2}$  and Median  $(X) = \frac{1}{2}$
  - $E(X) = \frac{1}{2}$  and Median  $(X) > \frac{1}{2}$
  - $E(X) < \frac{1}{2}$  and Median  $(X) = \frac{1}{2}$
  - $E(X) < \frac{1}{2}$  and Median  $(X) > \frac{1}{2}$
- A discrete random variable  $X$  taking non-negative values has the following moment generating function  $M_x(t) = e^{2(e^t-1)}$ ;  $-\infty < t < \infty$ . Then, the value of  $P(X \leq 1)$  is:
  - $e^{-2}$
  - $2e^{-2}$
  - $3e^{-2}$
  - $e^{-1}$
- Max  $z = 6x_1 - x_2$   
Sub to
 
$$\begin{aligned} 2x_1 - x_2 &\leq 2 \\ x_2 &\leq 3 \\ x_1, x_2 &\geq 0 \end{aligned}$$
 The above LPP has:
  - Unbounded objective function
  - Unbounded feasible region
  - Infeasibility
  - No solution
- The Laplace transform of  $\sin\sqrt{x}$  is:
  - $\frac{1}{s^2+1}$
  - $\frac{\sqrt{\pi}}{2s^2} e^{-\frac{1}{4s}}$
  - $\frac{\sqrt{\pi}}{2s^2} e^{\frac{1}{4s}}$
  - $\frac{1}{\sqrt{s+1}}$
- The solution of the differential equation:  $y \sin 2x dx - (y^2 + \cos^2 x) dy = 0$ , is
  - $3y^2 \cos 2x + 3y + 2y^3 = C$
  - $3y^2 \sin 2x + y^2 + 2y = C$
  - $3y \cos 2x + 3y + 2y^3 = C$
  - $3y \sin 2x + y^2 + 2y^3 = C$
- The solution of  $3\frac{\partial^2 z}{\partial x \partial y} - 2\frac{\partial^2 z}{\partial y^2} - \frac{\partial z}{\partial y} = 0$ ,
  - $\Phi_1(y) + e^{-\frac{x}{3}}\Phi_2(3y+2x)$
  - $\Phi_1(x) + e^{\frac{y}{2}}\Phi_2(3y+2x)$
  - $\phi_1(y) + e^{-\frac{y}{2}}\phi_2(3y+2x)$
  - $\phi_1(x) + e^{\frac{x}{3}}\phi_2(3y+2x)$
- The sampling scheme in which only first unit is selected randomly is known as:
  - Simple random sampling
  - Stratified random sampling
  - Systematic random sampling
  - Multiphase sampling
- An integrating factor of  $\frac{dy}{dx} = \frac{1}{3x+y^2+2}$ , is:
  - $e^{3x}$
  - $e^{-3x}$
  - $e^{3y}$
  - $e^{-3y}$
- Let  $T: \mathbb{R}^4 \rightarrow \mathbb{R}^3$  be a linear transformation defined by –  
 $T(x_1, x_2, x_3, x_4) = C(x_1 - x_2, x_2 - x_3, x_3 - x_4)$   
Then which of the following is true?
  - $\dim(\text{Ker } T) = 1$  if  $C \neq 0$
  - $\dim(\text{Ker } T) = 0$  if  $C = 0$
  - $\dim(\text{Ker } T) = 1$  if  $T$  is onto
  - (i) & (ii)
  - (ii) & (iii)
  - (i) & (iii)
  - (i), (ii) & (iii)
- Let  $X_1, X_2, \dots, X_n$  be iid random variables having pdf  $f(x) = \frac{1}{\theta} e^{-\frac{x}{\theta}}$ ;  $0 < x < \infty, \theta > 0$ . The cdf of largest order statistics  $X_{(n)} = \max(X_1, X_2, \dots, X_n)$  is:
  - $F_n(x) = \left(1 - e^{-\frac{x}{\theta}}\right)^n$
  - $F_n(x) = 1 - e^{-\frac{nx}{\theta}}$
  - $F_n(x) = 1 - \left(1 - e^{-\frac{x}{\theta}}\right)^n$
  - $F_n(x) = \frac{n}{\theta} \left(1 - e^{-\frac{x}{\theta}}\right)^{n-1} e^{-\frac{x}{\theta}}$
- Which of the following is 2-dimensional subspace of  $\mathbb{R}^3$  ( $\mathbb{R}$ )?
  - $\{(0, x, 0) \mid x \in \mathbb{R}\}$
  - $\{(0, x, 0) \mid x \in \mathbb{R}\} \cup \{(0, 0, y) \mid y \in \mathbb{R}\}$
  - $\{(x, y, 0) \mid x, y \in \mathbb{R}, x \neq y\}$
  - $\{(0, x, z) \mid x, z \in \mathbb{R}\}$
- $\lim_{x \rightarrow 0} (\text{Cosec } x)^{\frac{1}{\log x}}$  is:
  - $\frac{1}{e}$
  - $\frac{5}{2}e$
  - $\frac{-3}{2}e$
  - 1
- The ring  $Z[\sqrt{3}] = \{a + b\sqrt{3}; a, b \in Z\}$ 
  - is an integral domain
  - is a field
  - has units in the form  $a + 0\sqrt{3} = a$  i.e.,  $Z$
  - contains zero divisors
- Which of the following is true?
  - $*$  defined by  $a * b = \frac{a+b}{2}$  is a binary operation on  $Z$ .
  - defined by  $a * b = \frac{a+b}{2}$  is a binary operation on  $Q$ .
  - All binary commutative operations are associative.
  - Subtraction is a binary operation on  $N$ .



15. A box contains ticket numbered 1 to N. Let X be the largest number drawn in 'n' random drawing with replacement. Then the probability  $P(X = k)$  is:

- (a)  $\frac{k}{N}$  (b)  $\left(\frac{k}{N}\right)^n$   
 (c)  $\left(\frac{k}{N}\right)^n - \left(\frac{k-1}{N}\right)^n$  (d)  $\frac{1}{N}$

16. At point 'A' on a roller-coaster, as shown in figure, a 150 kg car is traveling at 13 m/s and is 3m above the ground. The speed of the car at point 'B', when it is 5m above the ground is:



- (a) 5.36 m/s (b) 7.42 m/s  
 (c) 9.13 m/s (d) 11.39 m/s

17. A particle of rest mass ' $m_0$ ' initially was moving with velocity  $0.6c$ . If the particle's velocity is increased to  $0.8c$ , the product of initial momentum and final momentum will be (where,  $c$  is velocity of light):

- (a)  $\frac{4}{3}m_0^2c^2$  (b)  $\frac{3}{4}m_0^2c^2$   
 (c)  $m_0^2c^2$  (d)  $2m_0^2c^2$

18. A circular hole of radius 1m is cut off from a disc of radius 6m. The centre of the hole is 3m away from the centre of the disc. Distance between the centre of mass of the remaining disc and centre of mass of the original disc will be:

- (a) 0.076m (b) 0.052m  
 (c) 0.086m (d) 0.015m

19. In a series LCR circuit ( $R = 2.5k\Omega$ ,  $C = 4\mu F$ ), the voltage across 'R' is 250V and the resonance frequency is 250 rad/s. At resonance, the voltage across 'L' will be:

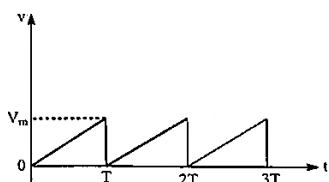
- (a) 57V (b) 64V  
 (c) 40V (d) 100V

20. The dimensions of electric flux/magnetic flux are the same as that of:

- (a) Energy density (b) Potential gradient  
 (c) Momentum (d) Velocity

21. The rms and average value of the waveform shown below are respectively:

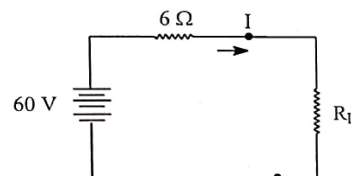
- (a)  $\frac{V_m}{\sqrt{3}}, \frac{V_m}{2}$   
 (b)  $\frac{V_m}{4}, \frac{V_m}{\sqrt{2}}$   
 (c)  $\frac{V_m}{\sqrt{2}}, \frac{V_m}{3}$   
 (d)  $\frac{V_m}{\sqrt{2}}, \frac{V_m}{\sqrt{3}}$



22. In a circuit, maximum power is transferred from a source of resistance,  $R_i$  to a load resistance  $R_L$  when:

- (a)  $R_L > R_i$  (b)  $R_L < R_i$   
 (c)  $R_L = R_i$  (d)  $\left(\frac{R_L + R_i}{R_L R_i}\right)^2 = 2\pi$

23. For the following network, the maximum power absorbed by  $R_L$  is:



- (a) 75W (b) 100W  
 (c) 125W (d) 150W

24. The state of polarization of the wave  $\vec{E}(z, t) = E_0[\hat{i} \sin(kz - \omega t) - \hat{j} \cos(kz - \omega t)]$  is:

- (a) linear (b) left elliptical  
 (c) right circular (d) left circular

25. What will be the thickness of a quarter wave plate when the wavelength of light is  $5890 \text{ \AA}$  and  $\mu_E = 1.553$ ,  $\mu_0 = 1.544$ ?

- (a)  $1.39 \times 10^{-5} \text{ cm}$  (b)  $1.39 \times 10^{-4} \text{ cm}$   
 (c)  $1.63 \times 10^{-3} \text{ cm}$  (d)  $2.75 \times 10^{-2} \text{ cm}$

26. Two beams of light having intensities I and 4I interfere to produce a fringe pattern on a screen. The phase difference between the beams is  $\pi/2$  at a point A and at a point B. Then the difference between resultant intensities at A and B is:

- (a) 2I (b) 4I  
 (c) 5I (d) 7I

27. In a transistor ( $\beta = 45$ ), the voltage across  $5 \text{ k}\Omega$  load resistance in collector circuit is 5V. the base current is:

- (a) 2.50 mA (b) 1.00 mA  
 (c) 0.98 mA (d) 0.022 mA

28. A transistor in CE configuration used as phase shift oscillator in which  $R_1 = R_2 = R_3 = R = 10 \text{ K}\Omega$ ,  $C_1 = C_2 = C_3 = C = 0.01 \mu F$  and  $R_1 = 10 \text{ K}\Omega$ . The frequency of oscillation will be:

- (a) 503.5 Hz (b)  $5.035 \times 10^3 \text{ Hz}$   
 (c)  $50.35 \times 10^3 \text{ Hz}$  (d)  $503.5 \times 10^3 \text{ Hz}$

29. The collector leakage current in a transistor ( $\beta = 120$ ) is  $300 \mu A$  in CE configuration. If the transistor is now connected in CB arrangement, the new leakage current will be:

- (a)  $2.4 \mu A$  (b)  $9.6 \mu A$   
 (c)  $0.992 \mu A$  (d)  $100 \mu A$



30. The residue of  $f(z) = \oint_C \frac{(2z-3) dz}{z(z-1)}$  where C is the circle  $|z| = 2$  at the pole  $z = 0$  is:  
 (a) 0 (b) 1  
 (c) 3 (d)  $2\pi$
31. The function  $f(x) = x^3$  in terms of Legendre polynomials can be expressed as:  
 (a)  $x^3 = \frac{3}{4}P_3(x) + \frac{2}{3}P_3(x)$   
 (b)  $x^3 = \frac{2}{5}P_3(x) + \frac{3}{5}P_1(x)$   
 (c)  $x^3 = \frac{3}{5}P_3(x) + \frac{2}{5}P_1(x)$   
 (d)  $x^3 = \frac{3}{5}P_3(x) - \frac{2}{5}P_1(x)$
32. The value of definite integral  $\int_{-\infty}^{\infty} \frac{\cos mx dx}{(x+c)^2 + a^2}$  (a and m are real and positive, and c is real) is:  
 (a) 0  
 (b)  $\frac{i\pi}{a} \exp(-am) \cos^2 cm$   
 (c)  $\frac{\pi}{a} \exp(-am) \cos cm$   
 (d)  $\frac{2\pi}{a} m \exp(-am)$
33. The energy of a photon of sodium light of  $\lambda = 5890 \text{ \AA}$  equals the bandgap of a semiconducting material. The minimum energy required to create an electron hole pair is:  
 (a) 2.1 eV (b) 4.2 eV  
 (c) 0.025 meV (d) 25 meV
34. When a hydrogen atom emits a photon of energy 12.1 eV, its orbital angular momentum changes by:  
 (a)  $4.22 \times 10^{-34} \text{ Js}$  (b)  $1.05 \times 10^{-34} \text{ Js}$   
 (c)  $6.33 \times 10^{-34} \text{ JS}$  (d)  $2.11 \times 10^{-34} \text{ Js}$
35. A molecule makes a transition between the ground state and an excited state having a lifetime of  $10^{-3} \text{ s}$ . the width of the associated spectral line is:  
 (a) 159.23 Hz (b) 19 Hz  
 (c)  $10^8 \text{ Hz}$  (d) 513.29 Hz
36. What is the similarity between a structure, union and enumeration?  
 (a) All of them let you define new values.  
 (b) All of them let you define new data types.  
 (c) All of them let you define new pointers.  
 (d) All of them let you define new structures
37. Normally a high level language is:  
 (a) Procedure oriented  
 (b) Non-procedure oriented  
 (c) Object oriented  
 (d) None of these
38. Relations produced from an E-R model will always be in:  
 (a) Second normal form  
 (b) Third normal form  
 (c) BCNF  
 (d) Fourth normal form
39. In a two pass assembler, the object code generation is done during the:  
 (a) First pass  
 (c) Third pass  
 (b) Second pass  
 (d) Not done by Assembler
40. "The employee salary should not be greater than Rs. 20,000." This constraint is of type:  
 (a) Attribute Constraint  
 (b) Integrity Constraint  
 (c) Referential Constraint  
 (d) Over defined Constraint
41. In a University schema, student and courses contains:  
 (a) 1-1 relationship  
 (b) 1-M relationship  
 (c) M-1 relationship  
 (d) M-M relationship
42. Stacks cannot be used to:  
 (a) Evaluate an arithmetic expression in postfix form.  
 (b) Implement recursion.  
 (c) Convert a given arithmetic expression in infix form to its equivalent postfix form.  
 (d) Allocate resources (like CPU) by the operating system.
43. What is the correct arrangement of memory types in decreasing order of access time?  
 (a) Hard Disk, Cache, Main Memory  
 (b) Hard Disk, Main Memory, Cache  
 (c) Cache, Hard Disk, Main Memory  
 (d) Main Memory, Cache, Hard Disk
44. Which one of the following is correct statement?  
 (a) The sequence  $\langle 46, 34, 28, 12, 26, 20, 2, 10, 11, 24 \rangle$  represents a max heap.  
 (b) The sequence  $\langle 24, 14, 10, 2, 20, 26, 12, 28, 34, 46 \rangle$  represents a max heap.  
 (c) The sequence  $\langle 6, 14, 8, 12, 26, 20, 2, 10, 14, 2 \rangle$  represents max heap.  
 (d) The sequence  $\langle 2, 14, 10, 2, 20, 26, 12, 8, 14, 6 \rangle$  represents max heap.



45. In the following program, how many times 'for' loop will be executed?

```
#include<stdio.h>
void main()
{
int i=5;
for (;;)
printf ("%d", i);
}
```

- (a) 59 times (b) 10 times  
(c) Infinite times (d) 20 times

46. What is the output for the program given below?

```
#include<stdio.h>
void main()
{
int i=5;
for (; i< 12; i++);
printf ("%d", i);
}
```

- (a) 5 6 7 8 9 10 11 (b) 5, 6, 7, 8, 9, 10, 12  
(c) 56789 (d) 12

47. The number X is given in IEEE 32-bit floating point format. What is the equivalent decimal value?

X = 110000011 111011000000000000000000

- (a) -130.625 (b) 130.75  
(c) 30.75 (d) -30.75

48. Which one of the following statements is true regarding Compiler and Interpreter?

- (a) Compiler translates one statement of the program at a time while Interpreter translates the whole program at once.  
(b) Interpreter translates one statement of the program at a time while Compiler translates the whole program at once.  
(c) Compiler can translate one statement of the program at a time and also the whole program at once.  
(d) Interpreter can translate one statement of the program at a time and also the whole program at once.

49. Which one of the following statements is not true regarding Doubly Linked List?

- (a) Has two pointers  
(b) Can traverse the list in backward direction  
(c) Can not traverse in forward direction  
(d) Delete operation is more efficient in doubly linked list than single linked list

50. What is a critical section?

- (a) A segment of code in which the process may be changing common variables  
(b) A program in execution  
(c) A locking technique  
(d) An algorithm to achieve deadlock avoidance

51. Depth First Search is a technique for:

- (a) Graph traversal (b) Sorting  
(c) Hashing (d) Scheduling

52. Suppose that in a C program snippet, following statements are used:

- (i) sizeof (int);  
(ii) sizeof (int\*);  
(iii) sizeof (int\*\*);

Assuming size of pointer is 4 bytes and size of int is also 4 bytes, pick the most correct answer from the given options:

- (a) Only i) would compile successfully and it would return size as 4.  
(b) i), ii) and iii) would compile successfully and size of each would be same i.e. 4.  
(c) i), ii) and iii) would compile successfully but the size of each would be different and would be decided at run time.  
(d) ii) and iii) would result in compile error but i) would compile and result in size as 4.

53. Adjacency Matrix is used for:

- (a) Asymptotic analysis  
(b) Sorting  
(c) Hashing  
(d) Graph representation

54. The Default and Maximum Size of Text Field in MS-Access is:

- (a) 50 and 255 Characters  
(b) 8 and 1 Gb  
(c) 266 Characters & 64000 Characters  
(d) None of these

55. Sparse matrices have:

- (a) Many zero entries (b) Many non-zero entries  
(c) Higher dimension (d) None of these

56. Every process consists of two steps CPU and I/O bursts. An I/O bound program will lead to:

- (a) Low CPU utilization  
(b) High CPU utilization  
(c) Few I/O bursts and more CPU bursts  
(d) Equal I/O and CPU bursts



57. The process of reclaiming the memory not used by any programming object is called:  
 (a) Collision (b) Concatenation  
 (c) Garbage collection (d) Traversing
58. What hardware architectures are not supported by Red Hat?  
 (a) SPARC (b) IBM-Compatible  
 (c) Alpha (d) Macintosh
59. Initial value of the semaphore is to allow only one of the many processes to enter their critic section is:  
 (a) 0 (b) 1  
 (c) 2 (d) 3
60. The maximum number of leaves in a binary tree of height  $n$  are:  
 (a)  $n^2$  (b)  $n^3$   
 (c)  $2n^2$  (d)  $2^n$
61. What is the value of the postfix expression  $6\ 9\ 3\ 2\ +\ -\ * \ ?$   
 (a) 10 (b) 24  
 (c) 74 (d) -18
62. Which of the following sorting method is stable?  
 (a) Straight insertion sort  
 (b) Binary insertion sort  
 (c) Shell sort  
 (d) Heap sort
63. The time complexity of binary search algorithm is:  
 (a)  $O(n)$  (b)  $O(n^2)$   
 (c)  $O(\log(n))$  (d)  $O((\log(n))^2)$
64. In a Dequeue:  
 (a) Insertion can take place at both ends but deletion can take place only at one end.  
 (b) Deletion can take place at both ends but insertion can take place only at one end.  
 (c) Insertion can take place at one end and (d) deletion can take place at another end.  
 (d) Insertion and deletion both can take place at any end.
65. What is the value of  $K$  in the following equation?  
 $(100\ 000\ 101\ 100)_2 + (3654)_8 = (K)_{16}$   
 (a) 8DF (b) FD8  
 (c) EC7 (d) 1A6
66. A digital computer is based on the principle of:  
 (a) Measurement (b) Logic  
 (c) Multiplication (d) Counting
67. The relational model uses some unfamiliar terminology. A tuple is equivalent to a:  
 (a) record (b) field  
 (c) file (d) database
68. The result of the UNION operation between  $R_1$  and  $R_2$  is a relation that includes:  
 (a) all the tuples of  $R_1$   
 (b) all the tuples of  $R_2$   
 (c) all the tuples of  $R_1$  and  $R_2$   
 (d) all the tuples of  $R_1$  and  $R_2$  which have common columns
69. The advantage of using prewritten software packages is:  
 (a) saves time and cost  
 (b) eliminates writing software  
 (c) eliminates program testing  
 (d) All of these
70. The Hexadecimal equivalent of 101001111 is:  
 (a) 612 (b) 14F  
 (c) 28F (d) 14E
71. What does 'BREAK' keyword do in C programming language?  
 (a) Restarts the loop  
 (b) Exits from the loop  
 (c) Stops the execution of the program  
 (d) Restarts the program
72. Consider the array definition  
 $\text{int num}[10] (3,3,3);$   
 Pick the correct answer:  
 (a)  $\text{num}[9]$  is the last element of the array  $\text{num}$   
 (b) The value of  $\text{num}[8]$  is 3  
 (c) The value of  $\text{num}[3]$  is 3  
 (d) None of these
73. The time required for a pulse to change from 10 to 90 percent of its maximum value is called:  
 (a) Rise time  
 (b) Decay time  
 (c) Propagation time  
 (d) Operating speed
74. What is output for the program given below?  

```
#include<stdio.h>
void main()
{
    int i = 500, j = 1000, k;
    k = (i>500 && j = 1000);
    printf ("k = %d", k);
}
```

 (a)  $k = 1$  (b)  $k = 0$   
 (c)  $k = 1000$  (d)  $K = 500$



75. What Is output for the program given below:

```
#include<stdio.h>
void main()
{
    int i=7;
    for (; i<12; i++);
    printf ("%d", i);
}
```

- (a) 7 8 9 10 11                      (b) 7, 8, 9, 10, 12  
(c) 7 8 9 10 12                      (d) 12

76. The time interval from the time of submission of a process to the time of completion is:

- (a) Cycle time                      (b) Waiting time  
(c) Response time                      (d) Turnaround time

77. What is the meaning of 'Underflow' in the context of data structure?

- (a) When a data structure is empty and an element is retrieved from that data structure.  
(b) When a data structure is empty and an element is inserted into that data structure.  
(c) When a data structure is full and an element is retrieved from that data structure.  
(d) When a data structure is full and an element is inserted into that data structure.

78. A phone number in a database is an example of:

- (a) record                      (b) field  
(c) sort                      (d) file

79. In tuple relational calculus,  $P_1 P_2$  is equivalent to:

- (a)  $\neg P_1 \vee P_2$                       (b)  $P_1 \wedge P_2$   
(c)  $P_1 \vee P_2$                       (d)  $P_1 \wedge \neg P_2$

80. The average time complexity of quick sort algorithm is

- (a)  $O(n)$                       (b)  $O(n^2)$   
(c)  $O(n \cdot \log n)$                       (d)  $O((n \cdot \log n)^2)$

81. When the following code is executed, what will be the value of x and y?

```
int x = 1, y = 0;
y = x ++;
```

- (a) 2, 1                      (b) 2, 2  
(c) 1, 1                      (d) 1, 2

82. Which of the following is an implementation version of an algorithm but not a program?

- (a) Block Code                      (b) Hamming Code  
(c) Pseudo Code                      (d) Linear Code

83. The data structure needed to convert infix notations to postfix notations is:

- (a) Linear list                      (b) Queue  
(c) Tree                      (d) Stack

84. Which of the following standards promises to provide enough characters to cover the entire world's languages?

- (a) Unicode                      (b) EBCDIC  
(c) Gray-Code                      (d) ISO

85. Which of the following memory allocation function changes the pre-allocated memory space in C?

- (a) calloc                      (b) realloc  
(c) malloc                      (d) delete

86. The function  $f(x, y) = 2x^4 - 3x^2y + y^2$  has:

- (a) maximum at (0, 0)  
(b) minimum at (0, 0)  
(c) neither maxima nor minima at (0, 0)  
(d) doubtful case at (0, 0) always

87. Let  $f(x, y) = \sqrt{|xy|}$ , then the value of  $f_x(0, 0)$  and  $f_y(0, 0)$  is:

- (a) 0, 0                      (b) 0, 1  
(c) 1, 0                      (d) 1, 1

88. The intrinsic equation of the catenary  $y = C \cosh x$  is:

- (a)  $C \sin h \frac{x}{c}$                       (b)  $\tan h \frac{x}{c}$   
(c)  $C \sec h \frac{x}{c}$                       (d)  $C \tan \psi$

89. Three identical fair dice are thrown independently. Let Y denote the number of dice showing even numbers on their upper faces. Then the variance of random variable Y is:

- (a)  $\frac{1}{2}$                       (b) 1  
(c)  $\frac{3}{2}$                       (d)  $\frac{3}{4}$

90. Optimal value of the following LPP:

$$\text{Max } z = 2x_1 + 3x_2$$

Sub to

$$6x_1 + 5x_2 \leq 25$$

$$x_1 + 3x_2 \leq 10$$

$$x_1, x_2 \geq 0$$

- (a) 12                      (b) 13.5  
(c) 11.92                      (d) 12.56

91. The Newton-Raphson method converges fast, if  $f'(a)$  is: (a is the exact value of the root)

- (a) Small                      (b) Large  
(c) Zero                      (d) None of these

92. Simpson's one-third Rule for evaluation of  $\int_a^b f(x) dx$  requires the interval  $[a, b]$  to be divided into:

- (a) an odd number of subintervals of equal width  
(b) an even number of subintervals of equal width  
(c) any number of subintervals of equal width  
(d) any number of subintervals



93. The equation  $yz + zx + xy = 0$  represents:  
 (a) a pair of planes  
 (b) a sphere  
 (c) a cone  
 (d) a cylinder
94. In simple random sampling without replacement, the probability that a specified unit of the population will be included in the sample: (Here  $n$  denotes sample size &  $N$  denotes population size)  
 (a)  $\frac{1}{N}$  (b)  $\frac{1}{NC_n}$   
 (c)  $\frac{n}{N}$  (d)  $\frac{1}{N^n}$
95. Condition that the plane  $lx + my + nz = p$  should touch the ellipsoid  $\frac{x^2}{a^2} + \frac{y^2}{b^2} + \frac{z^2}{c^2} = 1$  is:  
 (a)  $\frac{l^2}{a} + \frac{m^2}{b} + \frac{n^2}{c} = p^2$   
 (b)  $\frac{l^2}{a} + \frac{m^2}{b} + \frac{n^2}{c} = 0$   
 (c)  $a^2l^2 + b^2m^2 + c^2n^2 = p^2$   
 (d) None of these
96. The following system of equations:  
 $2x_1 + x_2 - x_3 = 2$   
 $3x_1 + 2x_2 + x_3 = 3$   
 has  
 (a) All degenerate solutions  
 (c) All non-degenerate solutions  
 (b) 2 degenerate and 1 non-degenerate solutions  
 (d) 1 degenerate and 2 non-degenerate solutions
97. Number of arbitrary constants in the equation of a cone is:  
 (a) 3 (b) 4  
 (c) 5 (d) 7
98. A discrete random variable follows Poisson distribution with parameter 3. The value of  $E(x - 6)^2$  is:  
 (a) 3 (b) 6  
 (c) 9 (d) 12
99. Let  $X$  be a random variable having distribution function  $F(x)$ , then which of the following statements may not be true?  
 (a)  $F(-\infty) = 0$   
 (b)  $F(+\infty) = 1$   
 (c)  $F(x)$  is right continuous  
 (d)  $F(x)$  is left continuous

100. Which of the following statements is not true?  
 (a) Mean of binomial distribution is 4 & variance is 3.  
 (b) Mean of Poisson distribution is 2 & variance is 2.  
 (c) Mean of normal distribution is 3 & variance is 12.  
 (d) Mean of geometric distribution is 2 and variance is 1.

## ANSWER KEY

1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
a	c	b	b	c	d	c	d	c	a
11.	12.	13.	14.	15.	16.	17.	18.	19.	20.
d	a	a	b	c	d	c	c	d	b
21.	22.	23.	24.	25.	26.	27.	28.	29.	30.
a	c	d	d	c	b	d	a	a	c
31.	32.	33.	34.	35.	36.	37.	38.	39.	40.
b	c	a	d	a	b	a	a	b	b
41.	42.	43.	44.	45.	46.	47.	48.	49.	50.
d	d	b	a	c	d	d	b	c	a
51.	52.	53.	54.	55.	56.	57.	58.	59.	60.
a	b	d	a	a	a	c	d	b	d
61.	62.	63.	64.	65.	66.	67.	68.	69.	70.
b	a	c	d	b	d	a	c	d	b
71.	72.	73.	74.	75.	76.	77.	78.	79.	80.
b	d	a	b	d	d	a	b	a	c
81.	82.	83.	84.	85.	86.	87.	88.	89.	90.
a	c	d	a	b	c	a	d	d	c
91.	92.	93.	94.	95.	96.	97.	98.	99.	100.
b	b	c	c	c	c	d	d	d	d