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Test Series Prepared By SUDHIR SIR (DEEP INSTITUTE) for I.S.S. PAPER-1 (TEST-1)

1. Let X be a r.v s.t $P[x=-2]=P[x=-1]$; $P[x=2]=P[x=1]$ and $P(x>0)=P[x<0]=P(x=0)$ what is $E(X)+V(X)$.
   (a) 0 (b) 5/3
   (c) 1 (d) none of above.

2. The p.d.f of r.v X in the Range $(0,\infty)$ is $f(x)=c\cdot x^3\cdot e^{-x}$. What is $E\left(\frac{1}{x}\right)$.
   (a) 1 (b) 1/6
   (c) 1/3 (d) does not exist

3. If $f(x,y)=\begin{cases} ke^{-(x+y)} & ; \ x\geq 0 \ ; \ y\geq 0 \\ 0 & ; \ otherwise \end{cases}$, is the joint p.d.f of r.v (X,Y). Find $P[X+Y<1]$
   (a) 0.3 (b) 0.5
   (c) $1+\frac{2}{e}$ (d) $1-\frac{2}{e}$

4. The r.v X follows exp (1) and let $Y=3X+5$ find mode of Y.
   (a) 0 (b) 2
   (c) 5 (d) none of above

5. A r.v X can assume any positive integral value n with prob^y proportional to 3^{-n}. What is $E(X)$.
   (a) 1 (b) 0
   (c) 1.5 (d) does not exist

6. If a r.v X has a symmetric density about the poiont 'a' and if $E(X)$ exists. And F(.) is c.d.f. of X.Then which of the following is true.
   (a) F(a-x)=1-F(a+x) (b) F(a-x)=F(a+x)
   (c) F(x)=1-F(-x) (d) F(-x)=F(x)

7. The joint p.d.f of Two r.v's X and Y is $f(x,y)=\begin{cases} 6 & ; \ x^2<y<x \ ; \ 0<x<1 \\ 0 & ; \ otehrwise \end{cases}$. Find $E(X/Y=y)$.
   (a) $\frac{\sqrt{y}+y}{2}$ (b) $\frac{\sqrt{y}-y}{2}$
   (c) $\frac{y}{2}$ (d) $\frac{\sqrt{y}}{2}$

8. Find the least values of K for whcih the prob^{t} that a r.v X with mean μ and variance σ^2 takes the value between $\mu \pm k\cdot\sigma$, is at least 0.95.

(a) $\sqrt{5}$ (b) $\sqrt{10}$

(c) $2\sqrt{5}$ (d) none of above.

9. Let $< X_n >$ be a seq^{n} of independent r.v's s.t $P\left[X_n = \pm n^{1/2}\right] = \frac{1}{2}$

Which of the following is true.

(a) W.L.L.N. does not HOLD (b) W.L.L.N. HOLDS

(c) $V(X_n)$ does not exist (d) a and c are true.

10. Let $X \sim b(n,p)$ and let $Y = \frac{X}{n}$ what is the distribution of Y.

(a) $P(Y=y) = \frac{n!}{ny!(n-my)!} p^{my}(1-p)^{n-my};\ y = 0, \frac{1}{n}, \frac{2}{n}, \ldots 1.$

(b) $P(Y=y) = \frac{n!}{y!(n-y)!} p^{my}(1-p)^{n-my};\ y = 0, \frac{1}{n}, \frac{2}{n}, \ldots 1.$

(c) $P(Y=y) = \frac{n!}{y!(n-y)!} p^{y}(1-p)^{n-y};\ y = 0, \frac{1}{n}, \frac{2}{n}, \ldots 1.$

(d) none of above.

11. If $X \sim b(n,p)$ and $Y \sim b(n,q)$, be independent r.v's, s.t p+q=1 , and $X_i's$ are iid variates with the probability distribution. $P[X_i = 0] = pq$; $P[X_i = 1] = p^2 + q^2$ and $P[X_i = 2] = pq$ which of the following is true.

(a) $X - Y$ *and* $\sum_{i=1}^{n} X_i$ have same distribution.

(b) $X + Y$ *and* $\sum_{i=1}^{n} X_i$ have same distribution.

(c) $X - Y$ *and* $\sum_{i=1}^{n} X_i^2$ have same distribution.

(d) none of above.

12. If $X \sim P(\lambda)$ and $Y/X = x \sim b(x, p)$ then find the distribution of Y.

(a) $P(p)$ (b) $P(\lambda p)$

(c) $b(\lambda, p)$ (d) $P(\lambda)$

13. The conditional distribution of r.v X given $Y = y$ is $\frac{e^{-y} \cdot y^x}{x!}$ and marginal p.d.f. of Y is e^{-y}, where X is a discrete variable i.e. $x = 0, 1, 2, 3, \ldots$ and Y is a continuous r.v as $y \geq 0$. Find Mode of X.

(a) 0 (b) 1

(c) 2 (d) all of above.

14. If $X \sim N(0, \sigma^2)$. Find distribution of $Y = |X|$.

(a) $\sqrt{\frac{\pi}{2}} \frac{1}{\sigma} e^{-\frac{1}{2\sigma^2} y^2}$; $y \geq 0$. (b) $\sqrt{\frac{\pi}{2}} \frac{1}{\sigma} e^{-\frac{1}{2\sigma^2} y}$; $y \geq 0$.

(c) $\sqrt{\frac{2}{\pi}} \frac{1}{\sigma} e^{-\frac{1}{2\sigma^2} y^2}$; $y \geq 0$ (d) none of above.

15. A r.v $X \sim N\left(0, \frac{1}{n}\right)$ with prob^t $\left(1 - \frac{1}{n}\right)$ and $N\left(1, \frac{1}{n}\right)$ with prob^t $\frac{1}{n}$. Find $E(X)$.

(a) 1 (b) 0

(c) 1/n (d) none of above.

16. If $X \sim U(0,1)$, find $V\left(\frac{1}{X}\right)$.

(a) 12 (b) 10

(c) 1 (d) none of above.

17. The conditional distribution of the r.v X for given $\lambda > 0$ is $\exp(\lambda)$. If $\lambda \sim \gamma(a, k)$ Find marginal distribution of X.

(a) $f(x) = \frac{k a^{k+1}}{(x+a)^{k+1}}$; $x > 0, k > 0$ (b) $f(x) = \frac{k a^{k}}{(x+a)^{k+1}}$; $x > 0, k > 0$

(c) $f(x) = \frac{k a^{k+1}}{(x-a)^{k+1}}$; $x > 0, k > 0$ (d) none of above.

18. Let $X_1, X_2, \ldots X_n$ be iid r.v's with $E(X_1)=\mu$ and $V(X_1)=\sigma^2$ and $E(X_1-\mu)^4=\sigma^4+1$.

Find $\lim_{n\to\infty} P\left[\sigma^2-\frac{1}{\sqrt{n}} \le \frac{\sum_{i=1}^{n}(X_i-\mu)^2}{n} \le \sigma^2+\frac{1}{\sqrt{n}}\right]$; where $Z \sim N(0,1)$

(a) $P[0 \le Z \le 1]$ (b) $2P[0 \le Z \le 1]$

(c) $P[0 \le Z \le 2]$ (d) none of above.

19. Find the p.d.f of the range W in a random sample of size 5 from the pop^n with p.d.f $e^{-x}: x>0$.

(a) $g(w)=4e^{-2w}\left(1-e^{-w}\right)^3 ; 0<w<\infty$ (b) $g(w)=4e^{-w}\left(1-e^{-w}\right)^3 ; 0<w<\infty$

(c) $g(w)=e^{-2w}\left(1-e^{-w}\right)^3 ; 0<w<\infty$ (d) none of above.

20. Two dice are thrown, their scores being a and b. The first die is left on the table while the second is picked up and thrown again giving the score c. What is $r(X,Y)$ where $X=a+b$ and $Y=a+c$.

(a) 1 (b) 0.5

(c) 0 (d) none of above.

21. If X and Y are identically distributed with p.m.f as $P[X=K]=\frac{1}{N}; K=1,2,3,\ldots N$.

Then r(X,Y) is.

(a) $1-\frac{6E(X-Y)^2}{N^2-1}$ (b) $1+\frac{6E(X-Y)^2}{N^2-1}$

(c) $1+\frac{6E(X+Y)^2}{N^2-1}$ (d) none of above.

22. Let X_1 and X_2 have a joint m.g.f. $m(t_1,t_2)=\left[a\left(e^{t_1+t_2}+1\right)+b\left(e^{t_1}+e^{t_2}\right)\right]^2$, in which a and b are positive constants s.t $2a+2b=1$. Find $V(X_1)+V(X_2)$.
(a) 1 (b) 0.5
(c) 2 (d) none of above.

23. The joint p.d.f of (X,Y) is given by $f(x,y)=\begin{cases}\frac{1}{2}ye^{-xy} & ;\ 0<x<\infty\ ;\ 0<y<2\\ 0 & ;\ otherwise.\end{cases}$
Find regression curve of X on Y.
(a) $x=1+y$ (b) $x.y=1$
(c) $x=1-y$ (d) none of above.

24. $X_i \overset{iid}{\sim} N(0,1);\ i=1,2,\ldots..n$. If $U=\dfrac{\sum_{i=1}^{n}X_i}{\sqrt{\sum_{i=1}^{n}(X_i-\bar{X})^2}}$. Find E(U).
(a) n (b) 0
(c) n-1 (d) none of above.

25. An Item from a production line can be good, bad or useless. Suppose a production is stable and let 1/3,1/3,1/3, denote the probabilities of three possible conditions of an item. The items are put into lots of 900. If X and Y are r.v's, represent, the number of items in the lots that are respectively in the first two conditions. Find COV(X,Y)
(a) 100 (b) 200
(c) -100 (d) none of above.

26. Nonparametric methods are based on:
(a) Mild assumptions
(b) Stringent assumptions
(c) No assumptions
(d) None of the above

27. If there are 10 symbols of two types, equal in number, the maximum possible number of runs is:
(a) 8
(b) 9
(c) 10
(d) none of the above

28. Formula for rank correlation between two sets of ranks with usual notations is:

(a) $r_s = 1 - \frac{6\sum_{i=1}^{n} d_i^2}{n(n^2-1)}$ (b) $r_s = 1 - \frac{6\sum_{i} d_i}{n(n^2-1)}$

(c) $r_s = 1 - \frac{6\sum_{i} d_i^2}{n(n-1)}$ (d) all the above

29. Wald-Wolfowitz runs test for two samples is affected when the ties occur:

(a) within samples
(b) between samples
(c) either within or between samples
(d) all the above

30. A box contains N coins, m of which are fair and the rest are biased. The probability of getting a head when a fair coin is tossed is 1/2, while it is 2/3 when a biased coin is tossed. A coin is drawn from the box at random and is tossed and get Head. Then, the probability that the coin drawn is fair, is

(a) $\frac{9m}{8N+m}$ (b) $\frac{9m}{8N-m}$

(c) $\frac{9m}{8m-N}$ (d) none of above

31. Given that the sum of two non-negative Integers is 200, the probability that their product is not less than 3/4 times their greatest product value, is

(a) $\frac{7}{16}$ (b) $\frac{101}{201}$

(c) $\frac{9}{16}$ (d) $\frac{10}{16}$

32. A coin is tossed repeatedly. A and B call alternately for winning a prize of Rs. 30. One who get head first, wins the prize. A starts the call. Then, the expectation of geting

(a) A is Rs. 10
(b) B is Rs. 30
(c) A is Rs. 20
(d) B is Rs. 20

33. One ball is drawn from a bag containing 4 balls and is found to be white. The events that the bag contains '1 white', '2 white', '3 white' and '4 white' are equally likely. If the probability that all the balls are white $\frac{p}{15}$, then the value of p is

(a) 6 (b) 8
(c) 9 (d) none of above

34. If A and B are two events such that $P(A)>0, P(B)\neq 1$, then $P\left(\frac{\bar{A}}{\bar{B}}\right)$ is equal to

(a) $1-P\left(\frac{A}{B}\right)$ (b) $1-P\left(\frac{\bar{A}}{B}\right)$

(c) $\frac{1-P(A\cup B)}{P(\bar{B})}$ (d) $\frac{P(\bar{A})}{P(\bar{B})}$

35. A distribution has variance 16, $\gamma_1=1$ and $\beta_2=4$. Then the third and fourth central moments are respectively

a. (60, 1024) b. (64, 1024)
c. (65, 1025) d. (60, 1020)

36. A random variable X has the probability distribution $P[X=x]=(2x+1)a,\ x=0,1,2,\ldots,8$
The value of a is

a. 1/81 b. 3
c. 1/9 d. 1

37. The moment generating function of a random variable X is

$$M_X(t)=\frac{2}{5}+\frac{1}{3}e^{2t}+\frac{4}{15}e^{3t}$$

The value of $E(X)$ is

a. $\frac{11}{5}$ b. $\frac{17}{15}$
c. $\frac{9}{5}$ d. $\frac{22}{15}$

38. The cumulative distribution function of any random variable is
I. always right continuous
II. right discontinuous at countable number of points
III. monotone non-decreasing
Select the correct answer from the following
a. None of the above three statements is always true
b. I, II and III are true
c. II and III are true, but I is flase
d. All the above three statements are true when the r.v. is discrete

39. A random variable X has the cumulative distribution function $F(x)$ given below :

$$F(x)=\begin{cases}0, & \text{if } x\le 0\\ x, & \text{if } 0<x\le 1\\ 1, & \text{if } 1<x\end{cases}$$

The probability density function corresponding to $F(x)$ is $f(x)$. Then read the following :
Statements

S : $f(x)=1$, if $0\le x\le 1$
$=0$, elsewhere

P : F(x) is discontinuous at $x=0$ and 1.

Choose your answer from the following codes

a. Both S and P are true
b. S is true but P is false
c. S is false but P is true
d. Both S and P are false

40. In an examination there are 80 questions each having four choices. Exactly one of these four choices is correct and the other three are wrong. A student is awarded 1 mark for each correct answer and - 0.25 for each wrong answer. If a student ticks the answer of each question randomly, then the expected value of his / her total marks in the examination is

a. - 15 b. 0
c. 5 d. 20

41. Two random variables X and Y are independent if :

a. $E(XY)=1$
b. $E(XY)=0$
c. $E(XY)=E(X)E(Y)$
d. None of the above

42. For the distribution function of a random variable X, $F(5)-$F(2) is equal to:

a. $p(2<x<5)$
b. $p(2\le x<5)$
c. $p(2<x\le 5)$
d. All of the above

43. If X follows binomial distribution with parameters n and p, then variance of X/n is

a. $\frac{p(1-p)}{n}$ b. $np(1-p)$
c. $p(1-p)$ d. $\frac{p(1-p)}{n^2}$

44. If X and Y are independent gamma variates with parameters m and n respectively, then the distribution of $\frac{X}{X+Y}$ is

a. gamma $(m, m+n)$ b. beta of first kind (m, n)
c. beta of second kind (m, m + n) d. gamma $(m+n)$

45. For an exponential distribution with probability density function

$$f(x)=\frac{1}{2}e^{-x/2}, x\geq 0 \quad \text{Find } E(X^4)$$

a. 100 b. 2
c. 384 d. none of above

46. The distribution for which the mode does not exist is ?

a. Binomial distribution
b. Poisson distribution
c. continuous Rectangular Distribution
d. None of the above

47. Let $X \sim B\left(5, \frac{1}{2}\right)$ and $Y \sim U(0,1)$ be two independent variables then, $\frac{P(X+Y\leq 2)}{P(X+Y\geq 5)}$ is equal to

a. 5 b. 6
c. 7 d. None of the above

48. If X and Y are two independent Poisson variates such $X \sim P(1)$ and $Y \sim P(2)$, the probability, $P(0 < X+Y < 3)$ is:

a. e^{-3} b. $3e^{-3}$
c. $4e^{-3}$ d. none of above.

49. Let $X_1, X_2, X_3, \ldots$ be a sequence of i.i.d. $N(0,1)$ random variables. Then, $\lim_{n\to\infty}\frac{1}{2n}\sum_{i=1}^{n}E(|X_i|)$ is equal to .

(a) 2 (b) 3
(c) 0 (d) none of above.

50. The median of the geometric distribution $\left(\frac{1}{2}\right)^x$ for $X = 1,2,3,\ldots$ is

a. 1 b. 0
c. $\frac{1}{2}$ d. none of above

51. Computer gathers data. Which means that they allow users to ..... data.

(a) present (b) input
(c) output (d) none of above.

52. Analog computer is

(a) a means of communicating with at a low level
(b) a device that operates on data in the form of continuously varying physical quantities
(c) an algebraic high level language
(d) All of the above

53. Which of the following is special register that holds machine instructions?

(a) Control unit (b) RAM
(c) Instruction register (d) ALU

54. Pick out the correct definition of buffer.

(a) Buffer is a hardware device that stores data outside the CPU
(b) The buffer is the portion of the CPU memory which stores the program instructions
(c) Buffer is a temporary storage between the CPU memory and a peripheral device
(d) Buffer is a device to convert input data into a computer readable form

55. Which one is not an impact printer?

(a) Laser printer (b) Dot matrix
(c) Daisy wheel (d) Either (b) or (c)

56. Primary memory store(s)

(a) data alone (b) program alone
(c) results alone (d) All of above.

57. What is the shape of the tracks on the recording surface of a disk platter?

(a) Spiralling (b) Elliptical
(c) Concentric (d) Wavy

58. When the numbers are represented as positive or negative, they are called

(a) unsigned number (b) complement
(c) signed number (d) binary number

59. Which of the following Windows utilities will erase unwanted files?

(a) Backup or restore wizard (b) Disk cleanup
(c) Disk defragmenter (d) All of these

60. The ability of an operating system to run more than one application at a time is called

(a) multi-tasking (b) object-oriented programming
(c) multi-user computing (d) Time-sharing

61. Which of the following is not an advantage of the DBMS?

(a) Elimination of data redundancy
(b) Ability of associated deleted data
(c) Increased security
(d) None of the above

62. ..... uses a standard called IEEE 802.6.

(a) LAN (b) WAN
(c) MAN (d) Internet

63. Which is the general network standard for the data link layer in the OSI reference model?

(a) IEEE 802.1 (b) IEEE 802.2
(c) IEEE 802.3 (d) IEEE 802.4

64. A web page is located using an

(a) universal record linking (b) uniform resource locator

(c) universal record locator (d) uniformly reachable links

65. Connection or link to other documents or web pages that contain related information is called

(a) dial-up (b) electronic commerce

(c) hyperlink (d) E-cash

66. In which of the following gates, the output is 1 if and only if atleast one input is 1?

(a) NOT (b) AND

(c) OR (d) NAND

67. A cast expression

(a) explicitly convers one data type to another

(b) can be used for forcing a floating point division to integer division

(c) It is useful for converting values that library function return to appropriate type

(d) All of the above

68. Which of the following is not a type of SQL statement?

(a) Data manipulation language

(b) Data definition language

(c) Data control language

(d) Data standard language

69. Conversion of binary number $(10001010)_2$ to its decimal number is

(a) $(138)_{10}$ (b) $(97)_{10}$

(c) $(99)_{10}$ (d) $(93)_{10}$

70. Conversion of octal number $(125)_8$ to its decimal number is

(a) $(90)_{10}$ (b) $(85)_{10}$

(c) $(87)_{10}$ (d) $(99)_{10}$

71. If the trapezoidal rule with single internal [0, 1] is exact for approximating the integral $\int_0^1 (x^4 - cx^3)dx$. Then, the value of c is equal to

(a) 2·5 (b) 1·5

(c) 0·5 (d) 0·05

72. From the given data

x	10	15	20
$f(x)$	1754	2648	3564

Find the value of x for $y = 3000$ by successive approximation method

(a) 16·96 (b) 16·896

(c) 16·66 (d) 14·89

73. Given $u_0 = 3$, $u_1 = 12$ $u_2 = 81$, $u_3 = 200$, $u_4 = 100$, $u_5 = 8$. Find $\Delta^5 u_0$.

(a) 750 (b) 557

(c) 755 (d) 752

74. Using Euler's method taking step size $= 0{\cdot}1$, the approximate value of y obtained corresponding to $x = 0{\cdot}2$ for the initial value problem $\frac{dy}{dx} = x^2 + y^2; y(0) = 1$, is

(a) 1·322 (b) 1·122

(c) 1·222 (d) 1·110

75. Find $\Delta^5 f(0)$, given $f(0) = 3, f(1) = 12, f(2) = 81, f(3) = 200, f(4) = 100, f(5) = 8$.

(a) 0 (b) 755

(c) 555 (d) 237

76. Find $\left[\Delta^2 x^5\right]_{x=0}; h = 1$

(a) 32 (b) 0

(c) 30 (d) 2

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77. Which of the following statement is not true?
(a) Divided differences are not symmetric function
(b) Divided differences are symmetric function.
(c) The n^{th} divided differenes of a polynomial of n^{th} degree are constant
(d) All of these

78. Which of the following result holds?
(a) $\Delta = \frac{1}{2}\delta^2 + \delta\sqrt{1+\frac{\delta^2}{4}}$
(b) $\Delta = \frac{1}{2}\delta^2 + \sqrt{1+\frac{\delta^2}{4}}$
(c) $\Delta = 1 + E$
(d) None of these

79. The Range-kutta method of order four is used to solve the initial value problem $\frac{dy}{dt} = f(t), y(0) = 0$ with step size h. Then the solution at $x = h$ is given by
(a) $y(h) = \frac{h}{6}\left[3f(0) + f\left(\frac{h}{2}\right) + 3f(h)\right]$
(b) $y(h) = \frac{h}{6}\left[f(0) + 5f(h)\right]$
(c) $y(h) = \frac{h}{6}\left[f(0) + 3f\left(\frac{h}{2}\right) + 3f(h)\right]$
(d) $y(h) = \frac{h}{6}\left[f(0) + 2^2 f\left(\frac{h}{2}\right) + f(h)\right]$

80. Find the area bounded by the curve of the x-axis from x = 7.47 to x = 7.52 from the following table by tropezoidal Rule?

x :	7.47	7.48	7.49	7.50	7.51	7.52
y :	1.93	1.95	1.98	2.01	2.03	2.06

(a) 0.09962 (b) 0.09965
(c) 0.9967 (d) 0.9968

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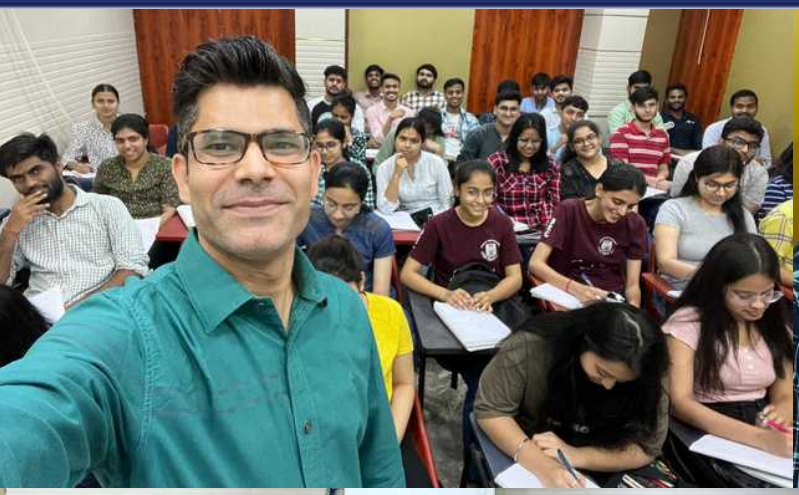

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